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CURRENT LABOR MARKET CONDITIONS
FOR
ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

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DEPARTMENT OF LABOR
Bureau of Employment Security
Office of Program Review and Analysis
July 1958

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This is the first in a new series of bimonthly reports prepared by the Bureau of Employment Security, Office of Program Review and Analysis, for the National Science Foundation and the President's Committee on Scientists and Engineers. It combines information on current conditions in 30 major labor market areas with statistics of the type previously published on job openings for selected engineering, scientific and technical occupations placed in inter-area clearance.

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REMOTE STORAGE

CURRENT LABOR MARKET CONDITIONS FOR ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

I. Summary

Rapid changes have characterized short-term demand-supply relationships in engineering, scientific, and related technical occupations during the past year. Labor market trends in these fields are clearly reflected in the volume of job openings for a group of selected engineering and scientific occupations placed in interarea clearance by public employment offices across the country.

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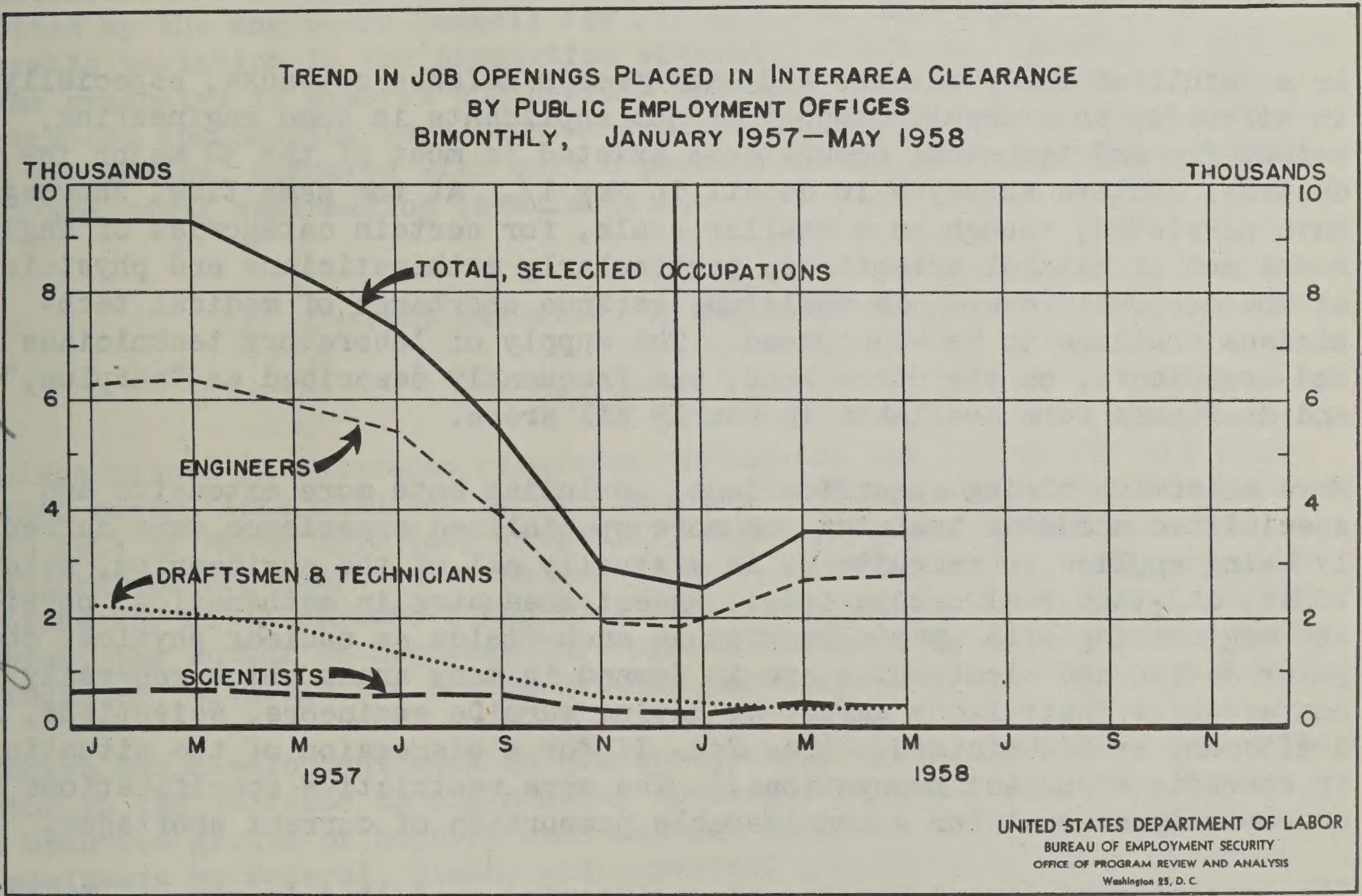

TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, JANUARY 1957—MAY 1958

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

After reaching a peak of more than 9,000 in early 1957, the number of such openings fell steadily and sharply until the total was down to only 2,600 in January 1958. Mainly because of new requirements for engineers in the missiles and highway programs, clearance openings in the selected occupations expanded to 3,600 in March and then remained almost unchanged to May.

Job Openings in Interarea Clearance - Public Employment Offices
Selected Occupations*, March 1957 - May 1958

Date	Number	Percent change
Mar. 1957	9,330	
Jan. 1958	2,634	-71.8
Mar. 1958	3,563	+35.3
May 1958	3,572	+0.2

*See Appendix Table II for a list of the occupations.

As a result of the recession and last year's defense cutbacks, especially in aircraft, an excessive supply of job applicants in some engineering, scientific and technical occupations existed in most of the 30 major industrial centers surveyed in detail in May 1/. At the same time, shortages have persisted, though on a smaller scale, for certain categories of engineers and of natural scientists, particularly mathematicians and physicists at the doctoral level. In addition, serious shortages of medical technicians continue to be widespread. The supply of laboratory technicians and assistants, on the other hand, was frequently described as "surplus," and draftsmen were available in nearly all areas.

More selective hiring specifications, including both more extensive and specialized academic training and more specialized experience, were currently being applied in recruitment in virtually all of the engineering, scientific, and technical occupations. Recent graduates in mathematics, physics, and engineering with specialization in such fields as nuclear physics, computer design and electronics are in demand in many areas which generally characterize their labor market as having surplus engineers, scientists, draftsmen, or technicians. (See Sec. II for a discussion of the situation in specific areas and occupations.) The more restrictive specifications undoubtedly account for a considerable proportion of current shortages.

The lessening of demand for recent engineering graduates in general is also evident from a placement survey conducted by the Engineering Manpower Commission of the Engineers Joint Council. Deans of Engineering in 132 institutions representing about 45 percent of the engineering graduates of 1958 reported that four weeks before graduation 2/, more than 21 percent of their graduates had not made employment commitments; 11 percent were considering firm job offers, however, and only 10 percent of their graduates had made no employment commitment. Among those with definite employment

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1/ For a list of the occupations and areas, see the Technical Notes, p. 14-15.

2/ Placement information was obtained as of May 20, 1958. Returns submitted before June 10th were included in the tabulations.

plans, about 59 percent had accepted employment offers, 10 percent planned to continue graduate study, and 9 percent planned to enter military service (see Table III). The survey included some information from the same institutions on a small group of physical science majors (831), graduates in business administration (2,448), and a very small number of liberal arts majors (389). The proportion of physical science majors with employment commitments followed very closely those for engineers, except that greater numbers of the physical science majors expected to continue post-graduate study rather than to enter employment. The proportion of graduates who had no employment commitment was much higher for graduates in business administration (about 25 percent) and liberal arts (30 percent) than for either engineering or physical science majors.

A distribution of 14,541 of the graduates from engineering curricula accredited by the Engineers Council for Professional Development showed considerable variation in the proportion without job offers. Nearly 24 percent of the graduates in mineral engineering and more than 16 percent of those in chemical engineering were without employment commitments one month before graduation, compared with only 6 percent of the graduates in aeronautical and civil engineering (see Table IV).

II. Current Situation by Major Occupation

Engineers

Openings placed in interarea clearance throughout the nation for all engineering occupations combined 1/ declined about 58 percent during the year March 1957 to March 1958 (see Table II). Aeronautical, mechanical, and metallurgical engineers were the groups most affected by the decline, while openings for civil engineers showed a small increase. Since January 1958, however, the number of openings for engineers placed in clearance has shown an increase, although the change between March and May was less than 2 percent.

Research and development work in electronics appears to have been one major factor in the increase in engineering openings. Another important cause has been the growth of highway construction programs affecting employment of engineers by federal, State, and municipal governments. Even in areas where such contracts have not already affected the number of openings available, it is indicated that an upturn in economic activity, or the awarding of government contracts, will result in a shortage of engineers because the number of new engineering graduates is not sufficient to meet an expansion in industrial and defense programs.

1/ Includes the following specialties: metallurgical and metallurgists, chemical, civil, electrical, industrial, mechanical, aeronautical, and mining.

Analysis by Area for 30 Major Areas:

Boston, Massachusetts

Shortages of civil, electrical, and mechanical engineers were reported in May. Further expansion of research and development work, particularly in electronics, is anticipated by September. (Clearance openings for civil, electrical, and industrial engineers increased between March 1957 and March 1958 but the total for May was smaller.)

Providence, Rhode Island

Industrial and mechanical engineers are in surplus supply in the area and current demand in these and other engineering occupations is very low. (Very few openings for engineers were placed in interarea clearance.)

Buffalo, New York

Expansion of technical staffs, particularly in the aircraft industry and in electronics, is increasing the demand for electrical, mechanical, and aeronautical engineers. Occupations characterized as balanced and surplus are a result of the current recession affecting the metalworking and chemical industries. Many engineers released from these industries possess job-acquired skills in production and production-related activities. (The number of openings declined from 100 in March 1958 to 64 in May 1958 but were still much higher than in March 1957.)

New York, New York

The lag of industrial construction resulted in only a small seasonal increase in the number of civil engineers, with government employment accounting for most of the increase. Some increases in engineering activity in manufacturing resulted from contracts for guided missiles. Opportunities for electronics engineers continued unfilled because of the lack of personnel with experience in research, design, and development of computer systems, transistors, and magnetic memory cores. Opportunities for industrial engineers exist in defense plants outside the area. (Sixty-seven openings in May 1958 represented an increase over the March figure of 52--an increase primarily for civil engineers.)

Paterson-Clifton-Passiac, New Jersey

Demand continues for electrical and mechanical engineers with electronics and instrument experience. Supply exceeds demand for chemical, civil, and industrial engineers. Expansion of research and development installations in the area indicates a slight increase in vacancies may be anticipated by Fall. (The sharp drop in clearance openings between March 1957 and March 1958 was chiefly for electrical engineers, but openings for metallurgical, civil, and mechanical engineers also declined. Openings for May 1958 showed a slight increase.)

Newark-Jersey City, New Jersey

While no change in engineering requirements is evident, a continuing demand for nearly all types of engineers, except aeronautical and mining engineers, is forecast because of the large numbers of research and development facilities maintained by industries in the locality. (Clearance openings showed a small increase in May but were only one-fourth the total for March 1957.)

Philadelphia, Pennsylvania

All engineering groups are in surplus supply except electronic engineers with specialized experience. Economic cutbacks in the automotive machinery and electrical machinery industries have affected the demand for engineering personnel, and termination or suspension of contracts by consulting engineering firms working on defense subcontracts has also reduced employment opportunities for engineers. (Job openings placed in clearance for electrical engineers indicate the extent of the decline. Openings for this group totaled 220 in March 1957, dropped to 27 in March 1958, and 17 in May 1958.)

Pittsburgh, Pennsylvania

Expansion in road construction activity, in electrical manufacturing, and in atomic energy are expected to favor an increase in the employment of civil, mechanical, and electrical engineers. Counterbalancing this, however, is the reduction in employment resulting from cutbacks in chemical and metalworking industries in the area. The supply in most of the engineering specialties is not expected to change greatly over the next few months, and openings in some engineering categories will continue unfilled because of the need for applicants possessing specialized academic requirements. The location of two new research laboratories in the area has been proposed. (Clearance openings declined sharply over the year from 293 in March 1957 to 15 in March 1958.)

Baltimore, Maryland

Since the latter part of 1957 the demand for engineers has remained static, and many applicants have left the State. There is no indication of any change during the immediate future. (The number of clearance openings declined from 393 in March 1957 to 23 in March 1958 and dropped further in May.)

Washington, D. C.

Openings, many in government employment, exist in civil, electrical and electronic, mechanical, and aeronautical engineering. (The number of openings placed in clearance more than doubled between March and May 1958. Recruitment for these positions continued all over the country.)

Louisville, Kentucky

The supply of engineers in all categories exceeded demand in the Louisville area. (Very few openings for engineers were placed in interarea clearance.)

Atlanta, Georgia

Job openings in the area declined from one year ago, but engineers were experiencing no great difficulty in placement. Some increase since early Spring was noted especially in connection with the hiring of engineers for a nuclear research facility located nearby. (Very few openings for engineers placed in interarea clearance.)

New Orleans, Louisiana

The number of job openings has shown a drastic drop over the year, mainly because of curtailments in local industries--chemicals, petroleum and aluminum--which have temporarily halted extensive expansion programs. The normal yearly increase in the supply of engineers from local universities is not expected to be sufficient to meet anticipated demands when the expected economic upturn does occur. Requests from industry for graduates of engineering schools is reported to be the lowest in years, with some graduates in chemical and civil engineering still unemployed. (Very few openings for engineers were placed in interarea clearance in either March or May 1958. In March 1957, a total of 26 openings was reported.)

Houston-Baytown, Texas

Supply generally exceeds any demand that has existed for the past several months, although this situation is the reverse of the demand-supply relationship one year ago. Contrary also to past years, there has been only limited recruitment of recent graduates. Professional people in the area are employed chiefly by the oil production and refining industry, chemicals, primary metals, oil tool manufacture and construction. Increases depend upon unpredictable labor market developments in these industries. Experience requirements for engineering applicants have been greatly increased, and some major industrial firms specify an age limitation of 35 years. (Very few openings for engineers were placed in interarea clearance.)

Dallas, Texas

Outside of the aircraft industry, there appears to be considerably less demand for engineers in the area than existed a year ago. A recent decline in the oil industry in the Southwest has been a major factor in reducing demand, and it does not appear that the supply-demand relationship will change greatly during the summer. Expansion in local defense plants is the major factor which could produce a significant change. (Very few openings for engineers were placed in interarea clearance.)

St. Louis, Missouri

Shortages of engineers, especially engineers for aircraft employment, have become less acute as a result of the stretchout in defense production schedules. However, it is believed that most engineering graduates obtain jobs long before graduation. (Clearance openings declined further in May 1958; the number in March 1957 was 37.)

Kansas City, Missouri-Kansas

Aggregate supply currently exceeds aggregate demand, but there are instances of shortages. The supply-demand situation is the reverse of the situation which pertained until approximately one year ago when demand declined. Currently there are more job openings than registrants among electrical and civil engineers and in these and other categories, registrants did not match job order specifications. (In May the number of openings remained at the March 1958 total, somewhat below the March 1957 total of 26.)

Indianapolis, Indiana

Employment reductions in the automotive, aircraft, nonelectrical machinery and electrical machinery industries during recent months have also reduced the demand for engineers in the area. A number of major companies were recruiting one year ago, and openings in various fields of engineering were listed. Cutbacks in defense contracts and reduced hiring by other companies have occurred, until at present few vacancies exist in the area. Jobs reported in inventory generally are for civil service positions. The highway department is continuing an apprenticeship program for students which it has carried on for several years because of the shortage of civil engineers. Although companies have their recruiting commitments at universities, many have done little actual hiring. (Very few openings for engineers were placed in interarea clearance.)

Cincinnati, Ohio

Shortages of metallurgical, electrical, mechanical and aeronautical engineers continued, largely as the result of defense activity by a few major companies in the area. Demand is chiefly for engineers with experience including supervisory experience, in research, development of new instrumentation for testing, and pilot production in the areas of high energy physics, radar systems and electronics. (Openings in May 1958 increased over the March figure, and equaled the March 1957 total.)

Columbus, Ohio

A downtrend in manufacturing, especially in the durable goods industries, has reduced job opportunities in research and engineering occupations. The situation has shifted during the past year from one of short supply to a more nearly balanced supply of engineers. Someupturn is anticipated because of the location of new industry in the area. (In March and May 1958 only about one-third as many openings for engineers were placed in clearance as in March 1957.)

Cleveland, Ohio

Demand for engineers has dropped sharply since one year ago when many engineering occupations were in short supply. A relatively small number of vacancies exist for engineers that require specialized experience in addition to engineering degrees. There was some indication of a pickup in demand for engineers during the latter half of May, but no important change in demand-supply relationship is anticipated during the summer months. Hiring specifications have become stricter during the past year, and company training programs have been curtailed. (Compared to 199 clearance openings for engineers in March 1957, the area reported only 33 in March 1958 and the number declined to 3 in May 1958.)

Detroit, Michigan

The labor supply for all occupations was very large in the area and demand was limited, principally to a small number of openings for mechanical engineers. The supply of mechanical engineers greatly exceeded the number of openings as a result of layoffs in the motor vehicle and equipment industries. (Very few openings for engineers were placed in interarea clearance.)

Chicago, Illinois

Uncertainty about government contracts and the impact of the recession has changed the situation from one of acute shortages to a slight surplus of engineers. As an example of this fact, the city engineering department has successfully filled all vacancies for mechanical, civil, structural and electrical engineers and is now limiting interviewing to college graduates with at least 10 years experience in a specific field. Still in short supply are structural engineers needed by architectural firms for designing highway bridges. In some instances salaries are lower than one year ago, but the chief difference has been in the trend toward raising hiring specifications in order to obtain better qualified applicants as replacements. Registered applicants are chiefly displaced workers of lesser skill and ability who are unable to meet current specifications. (The downward trend continued from 46 openings in March 1958 to 17 in May 1958, compared with 78 in March 1957.)

Milwaukee, Wisconsin

Over the year the number of applicants shows a rising trend and the demand for engineers shows a declining trend, however, a short labor supply prevailed for all of the engineering occupations except aeronautical and mining engineers. Openings for metallurgical, chemical, industrial, and mechanical engineers have increased slightly over March, but were fewer than one year ago. Shortages are expected to continue indefinitely in the professional categories. Employers are offering formal training courses as well as informal on-the-job training after engineers are hired, but a degree is a training prerequisite. (Clearance openings increased to 52 in May 1958 from 8 in March, but were still only one-half the March 1957 total.)

Minneapolis-St. Paul, Minnesota

Job openings for engineers dropped during the year. In May 1958 electrical engineers were the only group in short supply. It can be assumed that there is no longer a shortage of engineers in the area. The number of job openings has dropped sharply while the number of applications in the active file has doubled. Applicants are frequently seeking better jobs or jobs in their primary classification. (This area reported one of the largest declines. Clearance openings totaling 239 in March 1957 were primarily openings for mechanical and electrical engineers. The number dropped to less than 10 in the Spring of 1958.)

Denver, Colorado

Growth of manufacturing activity in aircraft parts, missiles, and electronic parts and equipment has had an important effect on employment of engineers. These industries have been growing in reverse trend to declines in other manufacturing over the past two years. Present labor supply is expected to be adequate except for electronic and aeronautical engineers and technicians. (Very few openings for engineers were placed in interarea clearance.)

Los Angeles, California

The period between 1950 and 1957 was one of dynamic growth for engineering employment in the area. During that period the labor demand-supply relationship was one of chronic and often acute shortage and requirements for many of the routine engineering jobs were diluted. Relaxation of hiring specifications made jobs available to workers with limited academic training in engineering. Setbacks in the total economy during the past year have affected the demand for engineers. Some phases of this demand have also suffered from a shift in defense procurement from manned aircraft to missiles. As a result of the stretchout in aircraft contracts a number of engineering jobs in production activity has been eliminated. Thus, the current demand-supply relationship shows a surplus of workers coexisting with unfilled needs for engineers in research and development activities--in some cases, even within the same company. Current demand is virtually restricted to college graduates, and recruitment is highly selective. (From a total of 529 openings for engineers in March 1957, the number declined to 75 in March 1958 but increased in May to 162. The increase in May was chiefly for aeronautical engineers.)

San Francisco-Oakland, California

Because of heavy cutbacks in durable goods manufacturing, especially non-electrical machinery, mechanical and electrical engineers were available for jobs in numbers which have been uncommon to the area for a long time. Both construction and engineering services have declined reducing the demand for civil engineers. The demand for chemical engineers in this area has held up relatively better than for other engineering specialties. A study of the active file indicates that a high proportion of engineering applicants, particularly in industrial engineering, did not hold college degrees. (Clearance openings in May 1958 were slightly below the March 1958 total of 26 compared with 90 openings for engineers in March 1957.)

Portland, Oregon

Relatively small numbers of engineers and scientists have been employed in the area in recent years, but currently because of the business downturn and the decline of employment in aircraft parts, other durable goods, fabricated metals, and construction, the supply of civil and mechanical engineers has been increasing. (Very few openings for engineers were placed in interarea clearance.)

Seattle, Washington

Demand exceeded supply in the Seattle area for electrical, industrial, mechanical, and aeronautical engineers. A number of the openings represented increased demand by the aircraft industry for engineering personnel during May. Many of the openings were listed in interarea clearance because suitable engineering personnel were not available in the area. (Clearance openings for engineers totaled 337 in May 1958, slightly above the number in March 1958 and above the March 1957 total. More than 200 of the openings were for electrical engineers.)

Natural Scientists

Clearance openings for all natural scientists dropped from 762 in March 1957 to 465 in March 1958 1/. Certain categories of scientists were in short supply in nearly all of the 30 labor market areas but clearance openings, especially for chemists, continued to decline between March and May 1958. Even in areas where the number of primary applications was greater than the number of openings, it was indicated that part of the job-seeking group did not have the necessary training and experience to match job specifications.

In New York the number of openings for mathematicians and chemists was the smallest in many years, but at the same time openings existed for physicists (or engineers) with experience in the research and development of computer systems and transistors. Scientists with advanced degrees were also reported in short supply in Philadelphia and in Cincinnati, while in Milwaukee the shortage of workers in these professions was expected to continue indefinitely.

The supply of scientists was considered "tight," but local demands were negligible in New Orleans and Cleveland, and on the West Coast demand was also relatively light. In that region more scientists were reported in the "unemployed" category than were unemployed one year ago. Even so, replacements for mathematicians and physicists were hard to find, as were personnel for nuclear research and missile development contracts which are gradually expanding in the San Francisco area.

1/ Since educational institutions are a major employer of natural scientists and these institutions do much of their own recruiting, utilizing the facilities of professional scientific societies, the number of openings in interarea clearance is probably less indicative of demand-supply relations for scientists than for engineers and technical personnel.

Draftsmen

During the past year clearance openings for draftsmen declined almost 90 percent from a national total of 1,851 job openings in March 1957 to 204 in March of this year. The May total of 244 openings indicated an upward trend. Draftsmen were generally reported in surplus supply in most of the 30 labor market areas. Several areas, however, reported a noticeable pickup in job openings some of which were attributed to increased activity in construction, and in the Boston area to shipbuilding contracts. Draftsmen were furloughed by a chemical company in Pittsburgh while in another section of the same labor market area demand exceeded supply.

The Detroit area reported large numbers of surplus draftsmen because of layoffs in the automobile industry. Houston, Texas also reported large numbers of surplus applicants, chiefly piping designers with chemical and refinery construction experience. In some areas employers were not interested in trainees or in workers with less than two years of specialized drafting experience, but in Milwaukee a small number of employers were participating in apprenticeship training programs. In St. Louis employers were reported willing to train high school graduates if they possessed sufficient mathematical background.

Laboratory Technicians and Assistants

While the trend in the number of openings in interarea clearance was down from one year ago, the decline was much smaller for laboratory technicians than for draftsmen. Job openings numbered 289 in March 1957 compared with about 175 in the Spring of 1958.

A serious shortage of medical technicians was reported in many of the 30 major labor market areas. The Bachelor of Science degree in one of the biological sciences and registration in the American Society of Clinical Pathologists is usually required for medical technicians. Both Boston and Philadelphia reported a serious shortage of such personnel. Medical technicians were also in short supply in New Orleans. Portland, Oregon, however, reported a surplus of laboratory technicians, some of whom were dental technicians. Training facilities in local medical schools were the chief source of qualified applicants. In some areas, however, it appeared that wage rates were not sufficiently high to attract qualified applicants.

The gradual increase in defense production--notably in Cincinnati and Columbus, Ohio, and Denver, Colorado--brough an increase in the number of job openings for some kinds of technicians. Three major companies were recruiting personnel for defense contracts in missiles and atomic energy in the Cincinnati area. Laboratory technicians and assistants needed to fill such positions, however, were required to have completed several years of pre-engineering courses and to have specialized employment experience. Some small increases were also noted in the number of openings in Newark, New Jersey. In Denver, electronic technicians were needed for employment on defense contracts.

In a large number of the 30 areas, however, laboratory technicians were in surplus supply. The Providence area reported a surplus of such personnel, and in New York declines in the demand for technicians were traced to economic conditions in the metalworking industries, abrasives, and chemicals. There was no sight of improvement in the demand for laboratory technicians in Baltimore, and Louisville also reported a surplus. A decline in the turnover rate for technicians, as well as a drop in the number of job openings in San Francisco were believed to stem from economy measures invoked by major industries. In Seattle, the supply of technicians exceeded a small and very specialized demand.

III. Appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Bureau of Employment Security, Office of Program Review and Analysis. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is an Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

A summary of information on clearance openings in all States has been utilized in the preparation of the bimonthly reports entitled Local Shortages in Selected Scientific and Engineering Occupations prepared at the request of the National Science Foundation, and the President's Committee on Scientists and Engineers.

In May 1958, for the first time, supplementary data on most of the same occupations were requested from the field offices of the 30 largest labor market areas. 1/ The area labor market reports provide information on local economic factors contributing to changing demand-supply relationships for engineering, scientific and technical personnel in the area.

In so far as possible other sources of information are utilized. One example is the inclusion in this report of information of the employment commitments of engineering graduates in May 1958 from a survey conducted by the Engineering Manpower Commission of the Engineers Joint Council.

1/ The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical, and metallurgists (0-14), Engineers, chemical (0-15), Engineers, civil (0-16), Engineers, industrial (0-18), Engineers, mechanical (0-19), Engineers, aeronautical (0-19.03), Engineers, mining (0-20), Natural Scientists, n.e.c. (0-35), Draftsmen (0-48), and Laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 15.

List of 30 Major Labor Market Areas

Boston, Massachusetts
Providence, Rhode Island
Buffalo, New York
New York, New York
Paterson-Clifton-Passiac, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Baltimore, Maryland
Washington, D. C.
Louisville, Kentucky
Atlanta, Georgia
New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas

St. Louis, Missouri
Kansas City, Missouri-Kansas
Indianapolis, Indiana
Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Detroit, Michigan
Chicago, Illinois
Milwaukee, Wisconsin
Minneapolis-St. Paul, Minnesota
Denver, Colorado
Los Angeles, California
San Francisco-Oakland, California
Portland, Oregon
Seattle, Washington

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-May 1958

Month and Year	All Occupations	Professional and Managerial	Selected Occupations			
			Total	Engineers	Scien-tists	Draftsmen & Technicians
Jan. 1956	27,887	12,845	6,844	4,792	476	1,576
Jan. 1957	35,629	14,498	9,327	6,349	723	2,255
March	34,390	15,952	9,330	6,428	762	2,140
May	31,452	14,007	8,434	5,976	606	1,852
July	29,144	11,879	7,467	5,437	650	1,380
Sept.	23,208	8,986	5,506	3,946	595	965
Nov.	13,859	5,388	2,908	1,993	323	592
Jan. 1958	14,665	7,726	2,634	1,817	297	520
March	14,451	8,244	3,563	2,717	465	381
May	15,552	9,439	3,572	2,764	397	411

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table II. Clearance Openings in Selected Occupations May 1958, March 1958, and March 1957

Occupation	May 1958	March 1958	March 1957	Percent of Change		Percentage Distribution May 1958
				May-Mar. 1958	Mar. 1958-Mar. 1957	
All selected occupations	3,572	3,563	9,330	+0.2	-61.8	100.0
Professional						
Engineers, total	2,764	2,717	6,428	+1.7	-57.7	77.4
Metallurgical	38	46	177	-17.4	-74.0	1.1
Chemical	70	122	288	-42.6	-57.6	1.9
Civil	807	836	678	-3.5	+23.3	22.6
Electrical	787	924	1,885	-14.8	-51.0	22.0
Industrial	186	162	299	+14.8	-45.8	5.2
Mechanical (except aero.)	616	445	1,980	+38.4	-77.5	17.2
Aeronautical	258	179	1,111	+44.1	-83.9	7.2
Mining	2	3	10	a/	a/	b/
Other professional	397	465	762	-14.6	-39.0	11.1
Physicist	105	105	249	0	-57.8	2.9
Mathematicians	79	80	219	-1.2	-63.5	2.2
Chemists	98	156	203	-37.2	-23.2	2.7
Life scientists	33	41	44	-19.5	-6.8	0.9
Writers, tech. pubs.	67	67	30	0	+123.3	1.9
Physical scientists	6	7	7	a/	a/	b/
Statisticians	9	9	10	0	a/	b/
Semiprofessional						
Draftsmen, total	244	204	1,851	+19.6	-89.0	6.8
Mechanical	65	70	751	-7.1	-90.7	1.8
Other	179	134	1,100	+33.6	-87.8	5.0
Laboratory technicians and assistants, total	167	177	289	-5.6	-38.8	4.7
Medical technicians	135	121		+11.6		3.8

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a/ Percentage change not shown where both absolutes are less than 25.
b/ Less than 0.5 percent.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Placement Situation for Engineering and Other Graduates
May 1958

	Graduates by Major Field							
	Engineering 1/		Physical Science		Business Administration		Liberal Arts	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Number of schools reporting	132		104		104		104	
Number of graduates	16,976	100.0	831	100.0	2,448	100.0	389	100.0
Graduates committed	13,286	78.3	644	77.5	1,508	61.6	226	58.1
Employment	10,069	59.3	346	41.6	826	33.7	58	14.9
Graduate studies	1,645	9.7	239	28.8	272	11.1	93	23.9
Military service	1,572	9.3	59	7.1	410	16.8	75	19.3
Graduates uncommitted	3,690	21.7	187	22.5	940	38.4	163	41.9
Considering offers	1,945	11.4	80	9.6	331	13.5	46	11.8
Uncommitted entirely	1,745	10.3	107	12.9	609	24.9	117	30.1

1/ Includes 15,591 graduates in 104 institutions offering engineering curriculums accredited by the Engineers' Council for Professional Development and 1,385 graduates in 28 non-accredited institutions.

Source: Engineering Manpower Commission of Engineers' Joint Council. Placement Survey . . .an evaluation of the status of employment placement and other commitments of engineering graduates of the 1958 class based on a survey made. . .during May 1958.

Table IV. Employment Commitments and Alternate Plans of
Engineering and Other Graduates
May 1958

Engineering Curriculum	Number and Percent of Graduates							
	Total							
	Number	Percent	With Jobs	Entering Graduate Studies	Entering Military Service	Considering Jobs	Without Job Offers or Otherwise Uncommitted	
Aeronautical	471	100	60.3	8.1	13.6	11.9	6.1	18.0
Chemical	1,508	100	46.4	15.8	9.6	11.7	16.5	28.2
Civil	2,186	100	63.0	8.6	9.6	12.8	6.0	18.8
Electrical	4,193	100	63.8	9.6	6.8	12.3	7.5	19.8
Industrial	817	100	54.8	6.8	11.6	11.0	15.8	26.8
Mechanical	3,353	100	62.8	7.3	8.6	11.2	10.1	21.3
Mineral	1,159	100	46.3	12.6	9.6	7.9	23.6	31.5
Others	854	100	54.3	13.2	8.3	12.2	12.0	22.2
Total	14,541	100	59.0	9.8	8.8	11.6	10.8	22.4
Other Curriculum								
Physical Science	831	100	41.6	28.8	7.1	9.6	12.9	
Business Administration	2,448	100	33.7	11.1	16.8	13.5	24.9	
Liberal Arts	389	100	14.9	23.9	19.3	11.8	30.1	

Source: Engineering Manpower Commission of Engineers Joint Council. Placement Survey, . . .an evaluation of the status of employment placement and other commitments of engineering graduates of the 1958 class based on a survey made. . .during May 1958.

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CURRENT LABOR MARKET CONDITIONS
FOR
ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

DEPARTMENT OF LABOR
Bureau of Employment Security
Office of Program Review and Analysis
September 1958

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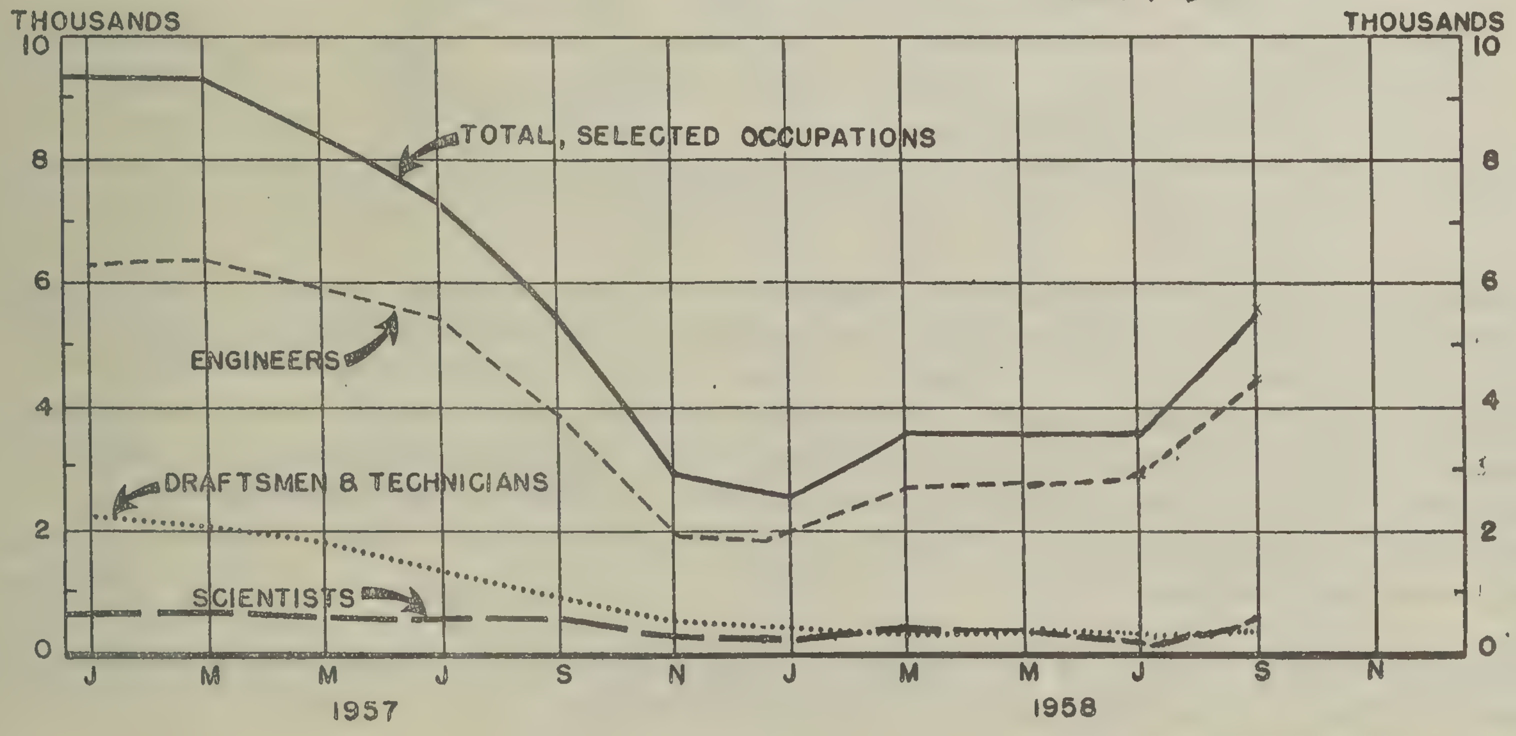
This is the second in a new series of bimonthly reports prepared by the Bureau of Employment Security, Office of Program Review and Analysis, for the National Science Foundation and the President's Committee on Scientists and Engineers. It combines information on current conditions in 30 major labor market areas with statistics of the type previously published on job openings for selected engineering, scientific and technical occupations placed in interarea clearance.

CURRENT LABOR MARKET CONDITIONS FOR ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

I. Summary

Sharp increases in the number of hard-to-fill openings for engineers, scientists, and related technical personnel marked the period between July and September. Vacancies in these selected occupations, which could not be filled locally and were placed in the system of interarea clearance maintained by public employment offices throughout the nation, increased by more than 50 percent from a stable level of about 3,600 during the spring to a total of 5,550 in September. The level of clearance openings in these selected occupations was slightly higher in September than during the comparable month in 1957. Anticipating the recession, clearance listings in these occupations had been declining for six months before September 1957. Their peak last year was 9,300, reached in March (see chart).

TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE
BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, JANUARY 1957—SEPTEMBER 1958



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

The recent increase affected nearly all groups of engineers and scientists. It was most significant for electrical and aeronautical engineers, for physicists, mathematicians, and for technical writers.

Job Openings in Interarea Clearance - Public Employment Offices
Selected Occupations, September 1957, July 1958, September 1958

	Sept. 1958	July 1958	Sept. 1957
All selected occupations	5,552	3,584	5,506
Engineers, total	4,490	2,921	3,946
Civil	794	794	321
Electrical	1,746	994	1,488
Industrial	165	136	223
Mechanical	1,051	648	1,162
Aeronautical	649	267	440
All other	85	82	312
Selected professional occupations	638	277	595
Physicist	159	67	189
Mathematician	176	70	124
Chemist	78	61	173
Technical writer	192	44	26
All other	33	35	83
Draftsman	255	212	791
Laboratory technician	169	174	174

Much of the increased demand for engineering and scientific personnel in September is attributed to expanding needs in the production of electronic equipment, missiles, and aircraft. Many items of missile production, for example, electronic equipment, guidance systems, propulsion systems, airframes and nose cones have reached the production stage requiring larger numbers of engineering personnel, technical writers, and draftsmen to standardize and develop mass production techniques for these complex items of equipment.

A description of the type of personnel required for such activities is contained in a report from San Jose, California:

> "...openings are continuously available for professional men, experienced in electronics, telecommunication, instrumentation, metallurgy, engineering writing, logical design, astro-physics, aero-dynamics and many other highly specialized professions in astronautics, aero-thermodynamics, missile and satellite research design and related fields."

Five States--Washington, California, New York, Michigan, and Colorado--reported increases of more than 100 in the number of unfilled job openings placed in interarea clearance for professional and managerial personnel. The largest numbers of openings were for aeronautical and electrical engineers carried on State inventories of unfilled openings in September.

Information on the current demand and supply situation for engineers and scientists and related personnel is also obtained from special bimonthly reports on conditions in the 30 of the largest labor market areas in the country. The month of reference for the lastest of these reports was July when demand, as evidenced by clearance listings, was still stable, and supply had just been augmented by college graduates.

These reports showed that the period between May and July was marked by an increase in job applicants at public employment offices in many of the nation's largest labor market areas (see Table III). During this time about 37,000 new engineering graduates from universities and colleges throughout the country were absorbed into the labor force 1/. Relatively few areas reported difficulty in placing these graduates, although their numbers were a major factor in the increase in applicants reported by many areas for July. Other sources of applicants were in-migrants from surrounding labor market areas and from other States. Layoffs were a relatively infrequent cause of an increased number of applicants but were reported to have affected engineers, particularly in the automobile industry, and a small number of geologists in exploration activities.

Some of the labor market areas reporting large increases in the numbers of applicants in the natural sciences during July, also reported unfilled vacancies, especially for mathematicians and physicists. Information on chemists, provided by these same areas, indicates large numbers of applicants in this occupation in July, particularly in the New York City area. Demand for chemists, as measured by unfilled openings placed in interarea clearance, moved upward in September, but the increase was smaller for chemists than for mathematicians, physicists, or technical writers (see table, page 2).

In the subprofessional occupations included in this report, relatively small numbers of openings for draftsmen or for technicians were placed in interarea clearance in July. In September, however, the number of openings for draftsmen increased to 255 from a total of 212 in July. Job specifications for unfilled openings for draftsmen in the 30 major labor market areas were primarily for those with highly specialized experience, particularly in electronics. The demand for laboratory technicians in most of the areas reporting shortages was for employment in hospitals and medical services.

1/ The Office of Education estimates that about 37,000 first professional degrees, and about 6,000 advanced degrees were awarded in engineering during the academic year 1957-58.

II. Current Situation by Major Occupation

Engineers

In September, unfilled openings for engineers placed in the system of interarea clearance maintained by public employment offices exceeded the level in September 1957. The total of 4,490 vacancies in September 1958 was well above the July level of 2,900 (see Table I).

Unfilled openings for engineers have increased by about 2,700 from the low month reached during the recession in January 1958, when 1,800 openings were placed in interarea clearance. Most of the increase during 1958 occurred between the months of January and March and between July and September (see chart, page 1).

The large increase in unfilled openings between July and September 1958 was primarily for electrical, mechanical and aeronautical engineers with unmet demand, as measured by openings placed in the interarea clearance system, increasing by 300 to 800 openings in each of four States--Washington, California, New York, and Michigan and by more than 100 in Colorado.

Information on labor market conditions and the demand and supply of engineers, by specialty 1/, was provided in special reports obtained from 30 of the nation's largest labor market areas in July. Compared with May, the number of applicants in all engineering classifications in these areas showed an increase of about 1,000 to a total of over 8,700. The greatest increase in numbers of applicants was in New York where 1,535 applicants were registered for employmtnt in July compared with 965 in May (see Table III). One-half of the areas reported smaller increases ranging from 5 to less than 100. In about six areas the number of applicants was nearly the same in both months, and in seven areas the number of active applicants for engineering employment declined between May and July.

Two areas reporting large shortages of engineers in July were Buffalo and Seattle. In both areas, the aircraft industry was the major employer. Experienced engineers also were needed in other areas including Boston, Pittsburgh, Baltimore, Cincinnati, Denver, and Los Angeles, in each of which vacancies were unfilled because applicants with the required specialization were not available.

Increases in demand for engineers for the electronic industry were reported in New York, Dallas, Cincinnati, Denver, and Seattle, and for the electrical and aircraft industries in Baltimore and Dallas. Missile production in Detroit and Denver were other important factors in the increased demand for electronic engineers in July. Defense spending was also given as a major cause of the improved demand situation in Dallas and Indianapolis. Expanded production in the petroleum industry in Dallas, and a revival in construction activity in San Francisco, were other trends noted in engineering employment in July.

1/ Reports from the 30 labor market areas provide information on engineers in the following specialties: metallurgical and metallurgists, chemical, civil, electrical, industrial, mechanical, aeronautical, and mining.

Civil engineering vacancies also increased primarily as the result of openings listed by the Federal government in Washington, D. C. Openings in State governments for highway construction and other programs were a source of improved demand for civil engineers in Seattle, Minneapolis, Denver, and Cleveland.

About one-third of the areas reported relatively little change in local labor market conditions for engineers between May and July, except for increases in numbers of applicants. These areas included: Boston, New Orleans, Houston, St. Louis, Cincinnati, Columbus, Chicago, Minneapolis, and Milwaukee.

Natural Scientists and Selected Professional Personnel

An increasing number of natural scientists registered for employment in the 30 major labor market areas furnishing occupational information. Active applications of natural scientists in these areas numbered nearly 800 in May and rose to well over 1,000 in July 1958. This total included both new graduates and advanced students seeking summer employment. Physicists, mathematicians, earth scientists, and selected professional personnel were included in the total, but chemists were reported separately. Twenty of the 30 major labor market areas reported an increase in the number of applicants in natural science occupations. Increases in the number of applicants were particularly large in the following labor market areas: New York, Philadelphia, Dallas, Chicago, and Los Angeles.

Neither the increase in the number of available applicants nor a decline in the number of unfilled openings in these occupations altered the fact that vacancies existed in many labor markets throughout the country. The most frequently mentioned shortages were for mathematicians and physicists, usually at the doctoral level. Specialization and experience of a particular type were frequently essential qualifications. The geographic range of the shortages of natural scientists, in the reporting areas, is indicated by the following list of those which reported unfilled vacancies: Boston, Buffalo, Philadelphia, Pittsburgh, Dallas, Indianapolis, Cincinnati, Chicago, and several labor market areas of California.

The location of several additional research facilities near Pittsburgh is expected to result in further increases in the total employment of scientists in that area. Stress is placed on a Ph.D degree and specialized experience as a necessary prerequisite to employment of physicists and mathematicians.

In the Dallas labor market area the increased need for scientists was attributed to demand by aircraft companies, especially for physicists and mathematicians. The rapid expansion of government research in a number of important scientific programs will tend to increase the shortages there. The only area reporting reductions in the number of scientific employees was New Orleans where geologists were laid-off because of declines in the petroleum industry, and consequent curtailment of off-shore exploration activities.

Information on the number of openings for natural scientists is obtained through the system of placing unfilled openings in interarea clearance maintained by public employment offices throughout the country. Between May and July the total number of such unfilled openings for natural scientists and other selected professional personnel declined from about 400 to slightly over 275. Openings for both physicists and mathematicians showed small declines in July (see Table II).

In September, however, a sharp increase occurred in the number of unfilled vacancies for natural scientists placed in interarea clearance. For physicists the number of openings increased from 67 in July to 159 in September; for mathematicians the increase was from 70 during July to 176 in September; and for technical writers the increase was from 44 in July to 192 in September. Openings for life scientists showed almost no change (see table, page 2).

Chemists

The 30 labor market areas surveyed in July [1] reported more than 1,200 chemists registered for work in public employment offices, of whom nearly one-fourth were registered in the New York City area. Recent graduates made up part of this total. Other areas reporting a large number of applicants were Boston, Newark-Jersey City, Chicago, Los Angeles, and San Francisco (see Table III).

In Philadelphia some hiring by firms in the chemical industry was reported during July, in contrast to layoffs during May. A number of the new laboratories are being established in the Pittsburgh area. Long-term growth in employment for other specialists including microbiologists and pharmacologists, as well as for chemists, is anticipated there.

Demand and supply for chemists was fairly well balanced in St. Louis with openings occurring in food processing and in government research.

Boston reported the possibility that women chemists who could not obtain employment in industry might accept less remunerative jobs in medical research and therby help to relieve a shortage of medical technicians.

Information on the number of unfilled openings for chemists placed in interarea clearance by public employment offices throughout the nation shows that during July the number of unfilled openings declined to 61 from 98 in May 1958. In September, however, openings for chemists placed in interarea clearance increased to 78, representing a change from the downward trend in earlier months, but still indicating that local shortages in this occupation were less stringent than for many of the other selected occupations. Furthermore, there appears to be a tendency to utilize chemical engineers rather than chemists in industrial employment.

1/ Includes the same labor market areas surveyed in May 1958, but information on chemists was not collected separately in May. One area which supplied statistical information for June 1958 could not be included in the comparison.

Draftsmen

Applicants increased between May and July, reflecting the entrance of new graduates seeking employment. In the 30 reporting labor market areas, the number of draftsmen seeking employment increased from 8,379 in May 1958 to 9,784 in July. Three labor market areas--New York, Detroit, and Los Angeles--each had more than 1,400 applicants.

Several areas, including Boston, Newark-Jersey City, and Washington, D. C. indicated that the number of available openings declined between May and July. The large number of surplus draftsmen in the Houston-Baytown area came chiefly from the oil industry. Many were piping designers with chemical and refinery construction experience.

It was noted that in Denver age specifications were quite rigid for this occupation and that relatively few women could be placed. While mechanical draftsmen were in surplus supply, it was predicted that the number of trained draftsmen in several specialized fields would decline rapidly in the area with an improvement in the economy.

In New York, a slight upturn occurred because of demand arising from defense orders. Hiring specifications for such positions as electro-mechanical draftsman included three or more years employment with printed circuits used in electronics. Very little hiring was reported for the construction industry or by firms producing consumer goods.

Several areas listed draftsmen as being in short supply. These areas included Atlanta--where experienced mechanical and architectural draftsmen were not available--and Indianapolis--where there were unfilled openings for architectural draftsmen. For the most part, however, surplus applicants were available in a majority of labor market areas while available vacancies were for well-trained draftsmen with specialized experience.

The number of unfilled openings for draftsmen placed in interarea clearance showed a small increase in September when the number of openings rose to 255 from 212 in July 1958. In September 1957, nearly 800 unfilled openings for draftsmen were placed in interarea clearance because they could not be filled locally compared with 1,174 in July 1957. Over the year, the decline in openings for draftsmen has been one of the largest percentagewise for any of the group of selected occupations.

Laboratory Technicians and Assistants

Applications of laboratory technicians on file in public employment offices in the 30 labor market areas rose from 2,927 in May to 3,519 in July. The increase in applicants was particularly great in New York where four times as many were registered in July 1958 as in May. At the same time, openings in the area were declining, partly because doctors were reducing the size of their staffs by not filling vacancies, and because turnover among laboratory technicians in hospitals declined. The area's shortage of medical technicians and several other types of medical service personnel was still acute, however.

Medical technicians were in short supply in other areas including Boston, Philadelphia, Columbus, and Cleveland, St. Louis and Minneapolis. A gradual increase in the educational requirements for this occupation was noted, but salaries have remained relatively low.

The shortage of laboratory technicians in Philadelphia persisted because many applicants did not meet the qualifications required. Biochemical laboratory technicians were also in short supply in Atlanta, and in Dallas an increase in demand for such personnel had occurred in the area's hospitals. Laboratory technicians for aluminum and paint research were being recruited in Pittsburgh.

In nearly all of the West Coast the supply of technicians exceeded available openings. This was particularly true in Portland where it was noted that all available openings were filled in the same month in which they were filed, yet at the end of the month the number of applicants, including many well-qualified ones, showed an increase.

The number of new entrants to the labor force was an important factor in the total increase in applicants registered for employment in July. The demand for laboratory technicians in the areas indicating a shortage was chiefly for employment in hospitals and medical services. Very few of the available openings were for physical science or engineering aides such as laboratory testers in industry.

Openings for technicians placed in interarea clearance because they could not be filled locally represent highly specialized job vacancies. The number of unfilled openings for technicians has remained relatively stable at about 170 since March 1958. At that time the total was nearly 40 percent lower than in March 1957.

Analysis for Engineers by Area:

Boston, Massachusetts

Engineers were in short supply to fill vacancies for which requirements of two to ten years' experience or graduate training are prerequisites. Openings available are for men with specialized experience, especially in electrical, civil and mechanical engineering.

Included among the available applicants were many 1958 graduates, and men with less than four years of college, whose experience had been as sales engineers in the electrical and mechanical fields. Both of these classifications and also industrial engineers were in surplus supply because manufacturing industries were not expanding. By September the return of some new graduates to school for advanced training is expected to decrease the supply of applicants. Except for the addition of new graduates, the employment market has changed very little since May. (In July, 283 engineers were registered for employment in the area; there were 63 unfilled openings, 45 of which were in interarea clearance compared with 21 in May 1958.

Providence, Rhode Island

The supply of engineers seeking employment in the area increased from 51 in May to 76 in July. The largest number of applicants were electrical, industrial and mechanical engineers. Very few openings were available in the area and these were for civil engineers. It is anticipated that a few more openings will be available for electrical, industrial and mechanical engineers in the late fall.

Buffalo, New York

Urgent shortages of electrical, mechanical and aeronautical engineers continued in the area, chiefly as a result of research and development contracts by several major employers. The education and experience required for the unfilled openings precluded the hiring of many available engineers. Available applicants in chemical and industrial engineering frequently did not possess the required qualifications, but had job-acquired skills related to production activities in metalworking, abrasives and the chemical industry which are now undergoing a recession. (The number of applicants for engineering jobs remained close to the May level at 140; unfilled openings placed in interarea clearance were up from 64 in May to 112 in July 1958.)

New York, New York

The major employment activity is centered in the electronics industry. Electrical engineers who are familiar with radar and antenae design, pulse and transistor circuitry, and similar aspects of electronics for instrumentation systems for guided missiles and conventional aircraft are in short supply. Few job openings are available in the area for other engineers, including some types of electrical engineers, chemical engineers, civil engineers or mechanical engineers, except those who have specialized experience related to electronics.

Relatively few civil engineers have accepted lower-paying employment in governmental agencies. Both the highway construction program and industrial construction in the area continued to lag. Outside the city there has been some recalling of aeronautical engineers in the airframe and aircraft engine industries. In New York, total registration of job applicants in all professional fields including both engineers and scientists was 50 percent higher than in July 1957. (The number of active applications for engineers rose from 965 in May to 1,535 in July; openings received in July totaled 18 compared with 49 received during May 1958.

Paterson-Clifton-Passaic, New Jersey

Increased demand for electrical, industrial and mechanical engineers--primarily by the aircraft, electrical goods, and instruments industries, and by engineering services--reduced active applications of engineers. Ten openings for experienced aeronautical engineers listed on the inventory for interarea clearance in May were still unfilled. There were fewer job openings for engineers available in July than in May. There was practically no demand for metallurgical, chemical or civil engineers. Hiring in electrical goods, fabricated metals, instruments, food, and the construction industries, as well as for engineering services will increase the number of engineering job opportunities during the next few months. (The number of applicants declined from 222 in May to 198 in July 1958; job openings placed in interarea clearance declined slightly to a total of 13 in July 1958.)

Newark-Jersey City, New Jersey

Openings for electrical engineers increased in July, but there were fewer openings for mechanical engineers. Other engineering categories were relatively unchanged from May when a continuing demand for all types, except aeronautical and mining engineers, was forecast. The recent upturn in the area's economy is expected to increase demand for all scientific and engineering occupations, and the long-range outlook is good because of the large numbers of research and development facilities maintained by industries in the area. (Active applicants for engineering employment increased from 507 in May to 589 in July, chiefly because of the registration of June graduates; only 3 openings were placed in interarea clearance in July.)

Philadelphia, Pennsylvania

Although all engineering groups were in surplus supply in May, and there was little evidence of change between May and July, some increase in demand is noted. Numbers of applicants are not increasing, and the supply of electronic engineers is narrowing. The numerical demand for electrical specialists is small, but extensive recruitment is being conducted. Civil engineers are being absorbed by government and consulting engineering firms for work on highway design and construction. Military design and research activities in the area are not increasing staff because of budget limitations, but expansion of research activities in some private plants nearby is anticipated. (Total engineering applicants declined from 593 in May to 517 in July; openings placed in interarea clearance rose from 10 in May to 20 in July 1958.)

Pittsburgh, Pennsylvania

A steady improvement in manufacturing industry is expected to result in the recall of some mechanical engineers and supporting personnel; otherwise no change in employment is forecast, and the present evenly balanced situation will continue. Several scientific organizations and educational institutions participated in a general review of the labor market situation for scientific and engineering personnel in the area.

Defense contract awards have had little influence on the area's employment of engineers. The re-location and establishment of several new research facilities in the area, however, will affect engineering employment, notably electrical engineers for an atomic reactor unit which is transferring personnel to a new plant in the area, and the movement out of the area of an instrument control center which caused layoffs of electrical and mechanical engineers. Other new research facilities are in the planning and design stage and will influence future employment. In hiring, both the educational level of applicants and specialized experience are necessary prerequisites to employment. (Active applications of engineers increased from 387 in May to 406 in July. Eighteen openings were placed in clearance in July compared with 15 in May 1958.)

Baltimore, Maryland

Job openings in July were slightly higher than in May, and are expected to increase further by fall, but are still far below the level of one year ago. Current openings are chiefly for highly-specialized experienced engineers for the aircraft and electrical machinery industries. Eight electrical engineers and smaller numbers of other engineers are needed. Hiring specifications include both an engineering degree, and from one to seven years of experience for work on the design and testing of micro-wave equipment, inductors and other electronic equipment. A small number of engineering graduates without experience are being hired in a junior engineering classification. In contrast to an out-migration of engineering and technical workers from the area during the spring, limited hiring is now underway by several major aircraft and electrical machinery firms. (Active applications totaled 76 in July, very nearly the same as in May 1958. Openings placed in interarea clearance declined slightly from 26 in May to 22 in July, in contrast to 332 in July 1957.)

Washington, D. C.

Openings for engineers were much higher than one year ago, chiefly because of an increase in demand for civil engineers by the Bureau of Public Roads. Total openings placed in interarea clearance for civil engineers numbered over 300 in both May and July compared with only 21 in July 1957. Applicants were required to have an engineering degree and State registration and be able to meet other Civil Service requirements. Other openings placed in interarea clearance were primarily for electrical engineers. The number of applications for civil engineering positions in the area declined from 42 in May to 34 in July. Applications for electrical engineers also declined from 41 in May to 20 in July 1958. (Engineering applicants numbered 123 in July compared with 166 in May 1958.)

Louisville, Kentucky

No jobs in engineering or other selected scientific and technical occupations were placed in interarea clearance during July because the supply of all types of specialized personnel equaled or exceeded demand in the area. This description also characterized the May situation. There were 39 applications on file for engineering vacancies--7 for chemical, 8 for electrical, 8 for industrial, and 16 for mechanical engineers. No improvement in demand for engineering personnel in the area is forecast.

Atlanta, Georgia

Reflecting the entrance of new engineering graduates, active applications of engineers increased from 50 in May to 83 in July. About 95 percent of the graduates are placed before graduation, with an estimated 20 percent remaining in the Atlanta area. Because of relatively low demand for engineers in manufacturing operations, new graduates are primarily employed in sales engineering positions. Graduates of engineering schools available for work in sales and promotion activities are in short supply.

Shortages continued in the categories of metallurgical and aeronautical engineers, but electrical engineers who had been in short supply in May were characterized as in "balanced" supply in July. Industrial engineers were the only group listed as being in surplus supply in the area. Major employers of engineering personnel include aircraft manufacturing firms and educational institutions, both of which have a constant demand for engineering and scientific personnel at the graduate levels. Experienced engineers are being recruited for employment by firms located in other areas of the South. Only two openings for engineers were carried in interarea clearance in May and July 1958.

New Orleans, Louisiana

A small increase in demand for civil and electrical engineers occurred during July, but the number of job openings continue to be very small. Only one opening for an electrical engineer was placed in interarea clearance in July because local applicants did not possess the qualifying experience. The current supply of applicants is three times greater than in May and four times that of July 1957. Surpluses of engineering personnel resulted from the slack in construction and oil exploration activities, shipbuilding and repair, and durable goods manufacturing industries. Except for certain specialized experience requirements, the local supply is sufficient to meet current needs. (Active applicants for engineering positions numbered 65 in July compared with 22 in May 1958 and with 15 in July 1957. Only one opening was placed in interarea clearance in July 1958.

Houston-Baytown, Texas

The supply of engineers has shown no change since May, with active applications numbering about 200 and no noticeable change in demand. Only 20 openings including those for scientific and technical personnel as well as for engineers were filed in the area in July 1958. Industries hardest hit by the present economic decline, including oil production and refining, chemicals, primary metals, oil tool manufacturing construction, are the major employers of engineering personnel in the area. Employment possibilities depend upon improved conditions in these industries. Major industrial firms in the area have raised the experience requirements, and placed a maximum age limitation of 35 years on applicants.

Dallas, Texas

The labor market became more active between May and July with increases in both demand and supply for several engineering occupations. Additions to the labor supply have resulted from in-migration into the area from surrounding towns--Houston, Midland, and Odessa, as well as from a number of other States. Most of the in-migrants indicate that they have come to Dallas because of a lack of opportunities in their prior areas of residence. Despite the increase in numbers of applicants, there has been no significant change in the general quality of available applicants and much of the supply fails to meet the specifications required for current job openings.

Increases in numbers of job openings result from expansions in defense industry in the area. Some of the additional demand, including a small gain in demand for chemical engineers occurred in the petroleum industry. The major source of demand for chemical engineers, however, is for municipal sanitation employment, and for the aircraft industry. Other jobs in municipal government are for civil engineers and arise from expansions in city planning activities and public works improvements. About one-half of the openings for industrial engineers are also in municipal government. The remainder are in aircraft and electronics. Employment opportunities for mechanical engineers declined about one-third since May chiefly because new contracts emphasize electrical engineering skills and reduce the demand for mechanical engineers. Applicants from other areas have been recruited to fill vacancies for mechanical engineers which existed two months ago.

Further increases in the demand for engineers depends primarily upon developments in local defense industries which now have backlogs of contracts which might produce unexpectedly large increases in the number of engineering openings at any time. Since no reductions in employment of engineers is forecast, any increase in supply could occur only through in-migration. (Active applications for engineers increased from 77 in May to 126 in July 1958.)

St. Louis, Missouri

Engineering employment in the area is dominated by the aircraft industry. Shortages, which have been chronic since World War II, have become less acute due to the recent recession and stretchout in defense production. (In May 1958, there were 69 engineering applicants; 37 job openings were placed in interarea clearance. No new information was submitted for July 1958.)

Kansas City, Missouri-Kansas

In May, aggregate supply exceeded aggregate demand, but there were instances of shortages. (In June there were 31 available applicants for engineering jobs, and 15 job openings in the area. No new information was submitted for July 1958.)

Indianapolis, Indiana

No significant upturn in local needs for engineers is indicated in the near future, although the number of unfilled openings increased in July chiefly because of the requirements of one military research organization in the area. A small number of engineers were also needed by manufacturing firms making electronic equipment, and by federal agencies in the area. The number of engineers registered for employment declined from 52 in May to 44 in July, as some were placed and others left the area for jobs elsewhere. Aeronautical engineers in the file of active applicants had been laid-off by one major aircraft company. Applicants also included some teachers seeking summer employment. (The number of active applicants declined between May and July 1958; only one opening was listed in interarea clearance.)

Cincinnati, Ohio

Demand and supply of engineering personnel changed little over the two-month period. Shortages were chiefly for experienced personnel for employment on defense-related research and development contracts held by a few major firms in the area. Many of the positions were for supervisory personnel with experience on particular research projects such as the following: ground radar, airborne fire control, transmitters and receivers and defense systems, antenna and micro-wave equipment, guided missiles, infra-red research, servo-mechanisms, transistorized equipment, and design, development, programming and application of computers and analytical services, design and development of aircraft jet engines, gas turbines, rocket engines, and atomic nuclear propulsion engines, including the related materials and instruments. (Active applicants for engineering employment increased from 32 in May to 63 in August. Openings placed in interarea clearance remained close to the May 1958 total of 29.)

Columbus, Ohio

Recruitment of engineering and related personnel has lost some of its intensity in the area because of the year-long decline in manufacturing production. Inventory accumulations accelerated the decline in demand for consumer durable goods, such as household appliances, and for other durables including aircraft, mining and construction equipment, and automotive hardware. Since July 1957, job opportunities in research and engineering departments have declined. No significant change in the demand-supply situation can be anticipated until industrial plant capacity reaches the production level of a year ago, but a moderate upturn in manufacturing activity is anticipated in the next few months. Some increase in employment will occur with the staffing of a new electrical machinery plant now under construction in the area. (Active applicants remained close to the May 1958 total of 48; in July, 14 openings were listed in interarea clearance, one-half of the vacancies were for electrical engineers.)

Cleveland, Ohio

Demand for most of the selected occupations has dropped in the area during the past year, but some indications of a slight pickup for engineering employment is evident during July. Hiring specifications have become more strict, with employers requiring more specialized experience and frequently showing preference for applicants who have post-graduate training. (In July 1958, a total of 455 engineers were listed in the active files with about two-thirds of the total classified as industrial and mechanical engineers. Only four openings were placed in interarea clearance in July, compared with seven in May 1958 and 118 in July 1957.)

Detroit, Michigan

Additional demand for engineering personnel in the Detroit area came chiefly from staffing requirements of a missile plant. Otherwise, the extremely low level of employment in the automobile manufacturing and related industries accounted for most of the labor surplus in engineering and scientific occupations. Applications of persons seeking employment declined over the period from May to July, and the number of job openings placed in interarea clearance showed a significant increase. The greatest portion of this increase, however, was for aeronautical engineers. Very few engineers in this classification were available in the area.

Faculty members for scientific and engineering departments were also needed by schools and colleges in the area, but hiring depended upon budgetary limitations and on ability to locate well-qualified teachers. (Engineering applicants on file declined from 711 in May to 653 in July; openings placed in interarea clearance increased from 3 in May to 276 in July 1958.)

Chicago, Illinois

Little change in the demand-supply situation for engineers in the Chicago area occurred between May and July. The most noticeable change was an increase in registration of applicants for engineering positions from a total of 444 in May to over 500 in July. Declining production has virtually eliminated job openings for metallurgists. Opportunities for chemical engineers are extremely low because firms in such industries as plastics, foods, meat packing and chemicals are doing little hiring. Even with stringent hiring specifications by the municipal government, including a requirement of 10 years of experience, positions in the City Engineering Department for mechanical, civil, structural, and electrical engineers have been filled. Layoffs by one major automobile company have resulted in a surplus supply of mechanical and industrial engineers, many of whom do not have degrees, but long experience in production activities. Age is an important hiring qualification, with some employers specifying engineers under 35 years of age. One of the few openings for engineers in the area is for structural designers experienced in designing highway bridges. (Openings placed in interarea clearance declined from 38 in May to 24 in July 1958.)

Milwaukee, Wisconsin

Occupational shortages have eased with the loosening of the labor supply, but shortages are expected to continue because of the mismatching of job requirements and worker qualifications. The supply of applicants in a number of engineering specialties increased between May and July. Firms in the area offer graduate or formal training courses and also informal on-the-job training after engineers are hired, but an engineering degree is a prerequisite for employment. (The number of active applicants rose from 131 in May to 167 in July 1958; openings placed in interarea clearance declined from 38 to 24 during the same period.)

Minneapolis-St. Paul, Minnesota

Active applications of engineers rose 55 percent between May and July 1958 because of the large number of graduates seeking employment. Job opportunities for engineers also showed an increase. Openings were chiefly for civil and mechanical engineers in the State Civil Service system. Over the year, the number of applicants has increased sharply, particularly in the mechanical and electrical engineering specialties. Orders received for engineering vacancies were about equal to those received during July 1957, but at that time there was a large backlog of unfilled orders, especially for engineers in research and development work for defense contracts. (Engineering applicants numbered 106 in May, compared with 164 in July; openings placed in interarea clearance increased from 11 in May to 32 in July 1958.)

Denver, Colorado

Curtailment of many local programs during the past six months accounts for the present balance in the supply of most types of engineering personnel.

Recruitment by out-of-State companies, and plans for the resumption of several major expansion programs, including highway development and missile manufacturing, may create demands in excess of the present and potential supply of engineers. Present graduates in the field of engineering are sufficient to meet anticipated demand, except for highly specialized engineers with missile experience. Electronic designers with aircraft and missile experience are one of the major groups listed in the State inventory because these job openings cannot be filled locally. (Active applications of engineers increased from 135 in May to 156 in July; openings placed in interarea clearance increased from 4 in May to 127 in July 1958.)

Los Angeles, California

In the period between May and July 1958, there was a sharp increase in demand for aeronautical and electrical engineers in the area. The general demand-supply situation for engineers remains about the same, with demand concentrated in a few highly specialized areas of engineering while the supply of available applicants does not generally possess the necessary requirements. At the same time that firms are seeking specialized types of aeronautical engineers, other engineering personnel in production-related activities are being laid-off. Broadscale recruitment of senior engineers in such categories as airplane designer, aeronautical research engineer, wind tunnel test engineer, and for aeronautical research engineers and aerodynamicists caused the large increase in the number of openings placed in interarea clearance in July. In some instances small increases in employment by other industries in the area has resulted in a decline in the number of applicants registered for engineering positions. (The number of applicants declined from 1,308 on file in May to 1,209 in July. Openings placed in interarea clearance doubled--increasing from 169 in May to 338 in July 1958--a figure well above the total of 279 in July 1957.)

San Francisco-Oakland, California

The employment situation for engineering personnel in the Bay area showed a moderate improvement in July, although still somewhat less favorable than in July 1957. Labor market factors affecting demand and supply for engineering and other selected scientific and technical personnel are described as "complex." Employers at the present time are attempting to upgrade their personnel by exercising greater selectivity than the size of the available supply of specialized workers during the last few years permitted. The labor market has tightened for workers in these occupations during the past two months. There is a possibility that work now projected will increase job orders for engineers with shipyard experience. Steady expansion is also anticipated in research and development work in missiles, nucleonics, electronics, and electronic data processing which will continue to draw on the supply of qualified engineers available either from those laid-off from local plants, from new graduates, or from in-migrants entering the area. Gradually improving economic conditions can also be expected to improve the market for specialized personnel, and it is clear that any real increase in demand in these occupations requiring long training time will shortly produce worker deficits.

During the period between May and July, the number of mechanical and civil engineering applicants registered for employment in local offices declined. Rehires appear to be an important factor in the decrease, as well as outmigration, particularly to the nearby San Jose area. A revival in construction activity is an important factor in the decline in civil engineering applicants. (The number of applicants, including those who reported a secondary choice in one of the engineering specialties, totaled 431 in July compared with 512 in May 1958; openings placed in interarea clearance dropped from 19 in May to 5 in July 1958.)

Portland, Oregon

Demand for engineers in the area declined sharply between May and June as reflected in openings placed in local employment offices, but in July the number of job openings showed a substantial gain. The number of openings for civil engineers increased from 1 in May to 6 in July, with demand expected to remain active during the summer. At the same time, the file of applicants seeking employment declined. Engineering groups in which the available applicants did not possess the required qualifications included chemical, electrical, and mechanical engineers. Although there were available applicants for metallurgical, industrial and aeronautical engineering positions, there were no openings in the area. (Total active engineering applicants numbered 66 in July compared with 64 in May 1958; there were no openings in interstate clearance.)

Seattle, Washington

Because of the large amount of aircraft employment in the area, Seattle continued to be one of the major areas with a shortage of engineering personnel. Demand was greatest for electrical, mechanical and aeronautical engineers. The number of engineering applicants increased slightly during the period between May and July, but the number of unfilled job openings also continued to mount, increasing from 801 at the end of May to 888 at the end of July. The number of openings listed on the clearance inventory by Seattle was more than twice as large as the number listed by any of the other areas supplying information on the labor market conditions for engineering and scientific occupations. In addition to the aircraft industry, another major source of unfilled job orders was for engineers for construction activities including State government employment. (Engineering applicants increased from 37 in May to 57 in July 1958; openings in interarea clearance increased from 801 in May to 885 in July 1958.)

III. Appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Bureau of Employment Security, Office of Program Review and Analysis. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is an Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

A summary of information on clearance openings in all States has been utilized in the preparation of the bimonthly reports entitled Local Shortages in Selected Scientific and Engineering Occupations prepared at the request of the National Science Foundation, and the President's Committee on Scientists and Engineers.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas 1/ for the first time in May 1958. These area labor market reports provide bimonthly information on local economic factors contributing to changing demand-supply relationships for engineering, scientific and technical personnel in the area. Insofar as possible other sources of information are utilized including occupational information from labor market areas.

1/ The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), Engineers, chemical (0-15), Engineers, civil (0-16), Engineers, industrial (0-18), Engineers, mechanical (0-19), Engineers, aeronautical (0-19.03), Engineers, mining (0-20), Chemists (0-07), Natural Scientists, n.e.c. (0-35), Draftsmen (0-48), and Laboratory Technicians and Assistants (0-50). A list of the 30 areas appears on page 19.

List of 30 Major Labor Market Areas

Boston, Massachusetts
Providence, Rhode Island
Buffalo, New York
New York, New York
Paterson-Clifton-Passaic, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Baltimore, Maryland
Washington, D. C.
Louisville, Kentucky
Atlanta, Georgia
New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas
St. Louis, Missouri
Kansas City, Missouri-Kansas
Indianapolis, Indiana
Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Detroit, Michigan
Chicago, Illinois
Milwaukee, Wisconsin
Minneapolis-St. Paul, Minnesota
Denver, Colorado
Los Angeles, California
San Francisco-Oakland, California
Portland, Oregon
Seattle, Washington

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-September 1958

Month and Year	All Occupations	Professional and Managerial	Selected Occupations			
			Total	Engineers	Scientists	Draftsmen & Technicians
Jan. 1956	27,887	12,845	6,844	4,792	476	1,576
Jan. 1957	35,629	14,498	9,327	6,349	723	2,255
March	34,390	15,952	9,330	6,428	762	2,140
May	31,452	14,007	8,434	5,976	606	1,852
July	29,144	11,879	7,467	5,437	650	1,380
Sept.	23,208	8,986	5,506	3,946	595	965
Nov.	13,859	5,388	2,908	1,993	323	592
Jan. 1958	14,665	7,726	2,634	1,817	297	520
March	14,451	8,244	3,563	2,717	465	381
May	15,552	9,439	3,572	2,764	397	411
July	14,420	7,514	3,584	2,921	277	386
Sept.	15,363	8,732	5,552	4,490	638	424

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table II. Clearance Openings in Selected Occupations
July 1958, May 1958, and July 1957

Occupation	July 1958	May 1958	July 1957	Percent change to July 1958 from:		Percentage Distribution
				May 1958	July 1957	July 1958
All selected occupations	3,584	3,572	7,467	+0.3	-52.0	100.0
Professional						
Engineers, total	2,921	2,764	5,437	+5.7	-46.2	81.5
Metallurgical	31	38	155	-18.4	-80.0	0.9
Chemical	50	70	272	-29.6	-81.6	1.4
Civil	794	807	564	-1.6	+40.8	22.2
Electrical	994	787	1,745	+26.3	-43.0	27.7
Industrial	136	186	258	-26.9	-47.3	3.8
Mechanical (except aero.)	648	616	1,501	+5.2	-56.8	18.1
Aeronautical	267	258	928	+3.5	-71.2	7.4
Mining	1	2	14	a/	a/	---
Other professional	277	397	650	-30.2	-57.4	7.7
Physicist	67	105	206	-36.2	-67.5	1.9
Mathematicians	70	79	152	-11.4	-53.9	2.0
Chemists	61	98	179	-37.7	-65.9	1.7
Life scientists	24	33	35	a/	-31.4	0.7
Writers, tech. pubs.	44	67	60	-34.3	-26.7	1.2
Physical scientists	6	6	8	a/	a/	0.2
Statisticians	5	9	10	a/	a/	0.1
Semiprofessional						
Draftsmen, total	212	244	1,174	-13.1	-81.9	5.9
Mechanical	38	65	366	-41.5	-89.6	1.1
Other	174	179	808	-2.8	-78.5	4.9
Laboratory technicians and assistants, total	174	167	206	+4.2	-15.5	4.9
Medical technicians	118	135	90	-14.4	+76.3	3.3

a/ Percent change not shown where both absolutes are less than 50.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations May 1958 and July 1958

Labor Market Area	Engineers		Chemists 1/	Natural Scientists		Draftsmen		Laboratory Technicians	
	July	May	July	July	May	July	May	July	May
Total.	8,746	7,815	1,240	1,042	797	9,784	9,681	3,519	2,927
Boston	283	245	61	70	34	224	227	179	160
Providence	76	51	9	8	---	46	31	44	20
Buffalo.	140	145	23	8	28	87	82	91	136
New York	1,535	965	354	198	113	1,455	1,252	439	106
Paterson-Clifton-Passaic.	198	222	36	8	7	162	177	67	77
Newark-Jersey City . . .	589	507	141	75	20	327	502	287	247
Philadelphia	517	593	38	39	36	734	732	294	304
Pittsburgh	406	387	39	20	19	614	580	294	272
Baltimore.	76	77	19	9	7	175	155	57	53
Washington, D. C.. . . .	123	166	35	57	78	110	55	59	29
Louisville	39	37	6	5	0	INA	51	INA	21
Atlanta.	83	50	6	4	10	40	51	41	47
New Orleans.	65	22	14	18	13	52	37	32	19
Houston-Baytown.	197	197	INA	78	78	330	330	80	80
Dallas	126	77	12	41	17	104	56	39	21
St. Louis.	69	69	10	4	4	78	78	56	56
Indianapolis	44	52	2	5	7	91	84	48	36
Cincinnati	63	32	10	0	4	62	91	61	55
Columbus	49	48	11	9	7	63	67	27	23
Cleveland.	455	435	48	14	8	590	492	158	158
Detroit.	653	711	44	8	11	1,485	1,376	217	137
Chicago.	502	444	73	60	40	295	311	135	124
Milwaukee.	167	131	22	32	27	85	82	48	43
Minn.-St. Paul	164	106	24	28	26	154	81	53	35
Denver	156	135	9	29	31	84	62	15	14
Los Angeles.	1,209	1,308	92	144	109	1,646	1,642	425	401
San Francisco-Oakland 2/	431	512	88	60	56	557	633	208	225
Portland	66	64	8	7	7	70	56	45	14
Seattle.	57	37	6	4	1	64	20	21	14

1/ Data for chemists was not obtained in May.

2/ Includes both primary and additional applications.

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Current Labor Market Conditions for Engineering, Scientific, and Technical Personnel

November 1958

UNITED STATES DEPARTMENT OF LABOR
James P. Mitchell, Secretary
BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

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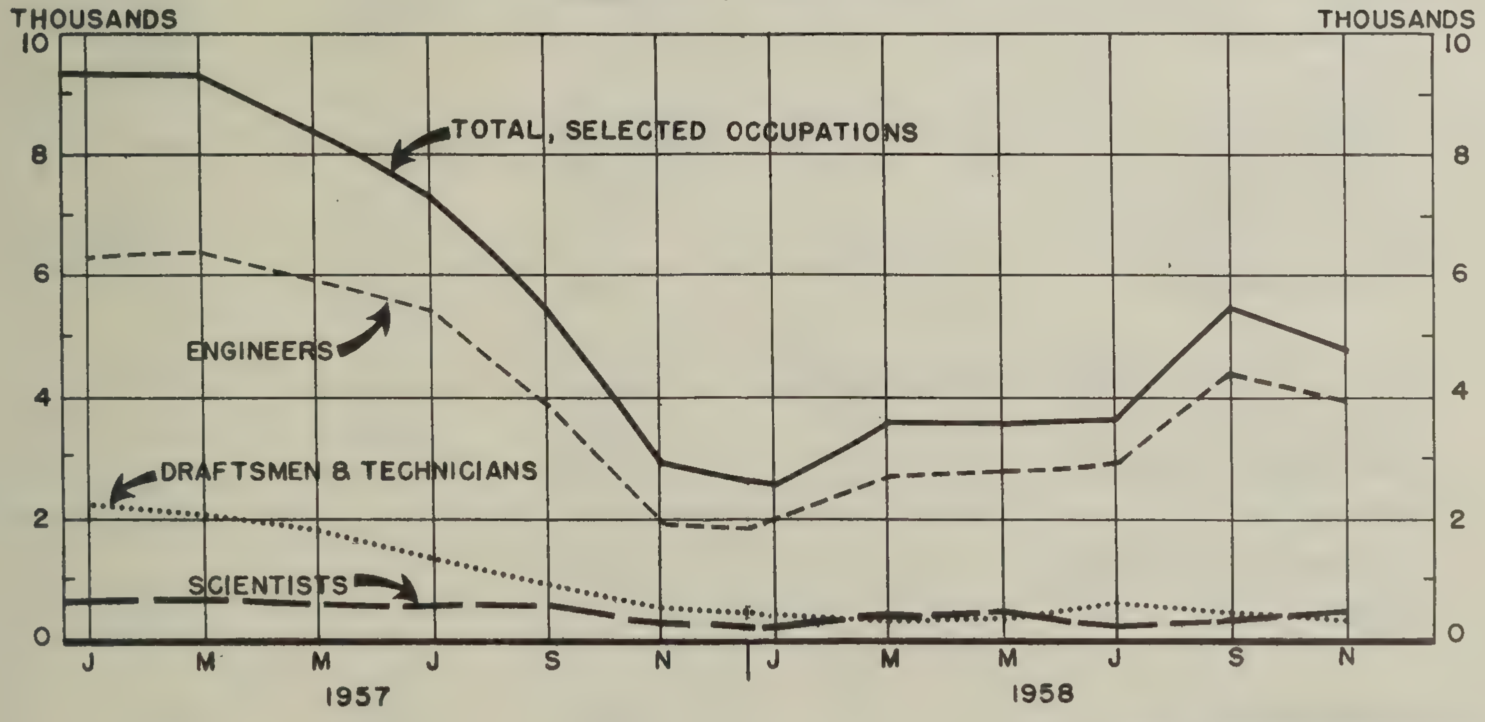
This is the third in a new series of bimonthly reports prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It consists mainly of summaries of field reports on current conditions in 30 major labor market areas and statistics on job openings for selected engineering, scientific and technical occupations placed in interarea clearance by public employment offices throughout the country.

CURRENT LABOR MARKET CONDITIONS FOR ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

I. Highlights of Interarea Recruitment Activity - November 1958

Unfilled openings for engineering, scientific and related supporting personnel in November declined by more than 550 from the 1958 high of 5,550 reached in September. The number of unfilled openings in November 1958, however, was nearly 2,000 higher than one year earlier when the effect of the recession had sharply reduced demand for engineering and scientific personnel.

Vacancies for engineers, which comprise four out of every five of the openings listed for the selected occupations, declined from 4,450 in September to 3,920 in November, a net drop of about 530 in vacancies across the nation that could not be filled locally. The decline was largest for mechanical engineers (for whom unfilled vacancies were down 270 to 760 in November), electrical engineers (down 170 to 1,580), and aeronautical engineers (down 100 to 530). Vacancies for civil engineers remained near the September level.



TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE
BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957– 1958

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

The number of engineering vacancies placed in interarea clearance by public employment offices was nearly twice as high as in November 1957. The over-the-year change in demand for engineers was particularly evident in increases in the number of unfilled openings for civil, electrical and aeronautical engineers.

Unfilled openings placed in interarea clearance for the selected scientific occupations followed closely the trend noted for engineers. The total number of such openings declined between September 1958 when a total of 626 were reported, to 593 in November. Physicist was the only scientific occupation for which the number of unfilled openings showed a significant increase between September and November.

Job Openings in Interarea Clearance - Public Employment Offices
Selected Occupations, November 1957, September 1958, November 1958

	Nov. P/ 1958	Sept. R/ 1958	Nov. 1957
All selected occupations	4,922	5,498	2,925
Engineers, total	3,925	4,447	2,006
Chemical	57	54	184
Civil	784	799	290
Electrical	1,584	1,750	608
Industrial	174	156	118
Mechanical 1/	762	1,033	573
Aeronautical	534	633	168
Selected scientific occupations	593	626	322
Physicist	182	156	81
Mathematician	137	163	52
Chemist	86	79	111
Technical writer	135	195	29
Other 2/	53	33	49
Draftsman	224	255	388
Laboratory technician	180	170	209

1/ Mechanical, except aeronautical.

2/ Includes other natural scientists, n.e.c.

P/ Preliminary

R/ Revised

The number of vacancies was also nearly twice as great for scientists in November 1958 as in November 1957. For each of the selected occupations, except chemists, the level of demand, as measured by unfilled openings, was substantially higher than one year ago. The increased demand for technical writers was particularly sharp over the period.

Draftsmen and laboratory technicians do not appear to have participated in the over-the-year increases in demand reflected in changes in unfilled openings for engineers and scientists. For both groups the number of such openings was substantially smaller in the fall of 1958 than one year ago, undoubtedly reflecting in part the lag in changes in demand for supporting personnel .

II. Trends in Labor Demand-Supply Situation by Occupation and Major Area - September 1958

A. Summary

Sharp increases in the number of unfilled openings for engineers, scientists and technical personnel marked the period between July and September 1958. The number of openings in the selected occupations included in this report, which were placed in the nationwide system of interarea clearance by public employment offices, increased by more than one-third from a stable level of about 3,600 during the spring (see Chart I) to a total of about 5,500 in September. In contrast to earlier months of 1958 when the number of such openings was well below the previous year's total, the September total was very close to the September 1957 level.

Reflecting the geographical concentration of expanding needs for scientific and engineering personnel, only about one-fourth of the 30 major labor market areas reporting information on the current situation for the same group of engineering and related occupations reported a significant increase in demand in these occupations in September. Partly because of this higher demand, the number of active applications in these occupational groups on file in public employment offices in these 30 areas declined by about 10 percent between July and September 1957. Other factors contributing to the decline were out-migration by applicants who presumably relocated in areas where employment was improving, and the return to school of students who had registered for employment in early summer. This last reason was most often given as a cause of the decline in the number of draftsmen among registrants.

Many of the shortages were reported in the 30 areas in defense-related industries such as missiles and aircraft, in research and development projects and for staffing of new laboratory facilities. The sharp increase in the overall demand for engineers at the national level, as indicated by the increased number of openings placed in interarea clearance in September, was chiefly confined to seven of the areas providing separate reports--Boston, Baltimore, Washington, D.C., Dallas, Chicago, Milwaukee, and Los Angeles. The change was particularly large for aeronautical, electrical, and mechanical engineers. The increase in demand for natural scientists was confined chiefly to physicists, mathematicians, and technical writers. Seattle reported about 200 unfilled openings for natural scientists and in Los Angeles the number of unfilled openings placed in interarea clearance doubled between July and September 1958.

The supply of available applicants for employment as draftsmen declined in about two-thirds of the 30 labor market areas. Although draftsmen, as well as engineers, with certain highly specialized experience particularly the electronics were generally in short supply. The number of draftsmen among the applicants remained greater than the number of available openings in nearly all of the areas.

The period between July and September was marked by relative stability in the demand and supply of laboratory technicians with the number of applicants also showing a decline, and the number of openings placed in interarea clearance showing a small increase. Experienced medical technicians were in demand in many of the 30 labor market areas reporting shortages, particularly for specialties in which a college degree was required.

B. Analysis by Major Occupation

Engineers

Three factors appeared to be primarily responsible for a net decline of about 10 percent in the supply of engineering applicants in September within the 30 major areas providing information on the current labor market situation for engineering personnel. Some increase in demand was evidenced in areas widely dispersed throughout the nation; the out-migration or movement away from some labor market areas of applicants, who presumably relocated in areas where employment was improving; and finally the return to school of students who had registered for employment in early summer.

Demand for engineers showed a sharp increase at the national level, as reflected in information on the number of unfilled engineering vacancies placed in interarea clearance between July and September. The total number of such vacancies rose from about 2,920 in July to about 4,450 in September, after remaining relatively stable since March (see Table I). The change in the number of unfilled openings placed in interarea clearance was particularly large for aeronautical, electrical, and mechanical engineers. However, all engineering groups except metallurgists and metallurgical engineers and mining engineers, which are numerically the smallest engineering groups shown separately in the published reports, shared in the increase (see Table II). Both civil and electrical engineering vacancies were higher than one year ago when the recession had already caused the cancellation of job orders placed with the Employment Service. Although relatively stable between July and September, the number of unfilled job openings for civil engineers in September was about two and one-half times as great as in September 1957, reflecting large increases in the nation's highway building program and the higher level of other types of construction activity in many major labor market areas.

The number of unfilled openings for engineers placed in interarea clearance by the 30 major labor market areas providing special information on the selected occupational groups does not appear to indicate as sharp an increase in demand as the data on clearance openings for the nation as a whole. As indicated in the information furnished separately for engineers 1/, many areas noted that demand for engineers had remained relatively unchanged since July. In other areas demand had actually declined because of layoffs, changes in defense contract activity or for seasonal reasons such as the decline in construction activity. It appears that increases in the number of openings placed with the Employment Service for engineers

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1/ See Analysis for Engineers by Area beginning on page 12.

increased by a significant amount between July and September in only 7 of the 30 areas--Boston, Baltimore, Washington, D. C., Dallas, Chicago, Milwaukee, and Los Angeles. 1/

Natural Scientists and Selected Professional Personnel

The supply of natural scientists, as measured by applicants for employment in public employment offices declined about 10 percent between July and September in the 30 major labor market areas providing detailed information on these occupations. In many areas part of the decline was attributed to the return to school of students who had been seeking summer employment. The largest number of applicants was reported in New York, where about 200 were registered in September. Others of the selected labor market areas reporting between 50 and 100 applicants for these occupations in September included Boston, Newark-Jersey City, Houston, and Los Angeles.

Information on demand for personnel in these occupations, reflected in statistics on the number of unfilled openings placed in interarea clearance, shows a large increase occurred between July and September 1958 throughout the nation as a whole. For physicists the number of unfilled openings increased from 67 in July to 156 in September; for mathematicians the increase was from 70 in July to 163 in September, and for technical writers the increase was from 44 in July to 195 in September.

Reflecting increasing demands for scientific personnel in the aircraft industry, Seattle reported about 200 unfilled openings. Examples of unfilled openings placed in interarea clearance for scientists were contained in reports from major labor market areas for September. In New York City the supply of chemists, geologist and agronomists exceeded listed demand. Scientists with experience in certain phases of electronics, however, were needed in the area. In Boston also, the staffing of two electronic research facilities created a demand for physicists. Physicists were also needed for a nuclear power laboratory in Milwaukee. In Philadelphia demand was reported greatest for bacteriologists and biologists.

Unfilled openings for natural scientists were nearly twice as great in Los Angeles in September as in July. Among the large number of registered applicants in the San Francisco Bay area in July were many entrant workers. By September the number of such registrants declined from 60 to 46 in the area, indicating that most had found jobs.

1/ Demand was considered to be relatively stable unless a difference of at least five openings was reported between July and September.

Among other West Coast labor market areas reporting on the supply and demand for scientists and engineers, Portland, Oregon indicated an increase in registered applicants, many of whom were inmigrants from other States. Relatively few job openings existed for scientists in the area, however, and the supply was characterized as "surplus." In Seattle, more than 200 unfilled job openings in scientific occupations were placed in interarea clearance, but only two applicants were registered for employment.

A number of areas reported continuing shortages of some very highly trained scientific personnel with specialized experience, but also indicated little change in the level of such demand in September. A slight decline in demand occurred in Dallas between July and September chiefly as a result of the shift in research activity carried on under government contracts.

Chemists

Chemists registered for employment in the 30 major labor market areas declined from over 1,200 in July to 1,100 in September. As in July, more than one-fourth of the registered applicants were in the New York City area.

Demand for chemists, as reflected in unfilled openings placed in interarea clearance in these 30 areas, remained relatively small with a total of only 31 openings for chemists compared with 25 in July. For the nation as a whole, the total number of unfilled openings placed in interarea clearance was 79 in September compared with 61 in July--a much smaller numerical increase than occurred during the same period for physicists and mathematicians.

Demand for chemists appears to be highly concentrated in areas with industries which normally employ large numbers of chemists, such as drugs and pharmaceuticals, petroleum, food and chemicals. Even in areas where such firms are concentrated, however, the demand has been chiefly for replacements. Industrial growth, unless it is accompanied by an expansion in laboratory facilities, has not resulted in increased demand for chemists. In New York, for example, expansion of the research department of a major pharmaceutical firm brought the only increased demand for chemists.

Qualified applicants were needed in Philadelphia but the shortage was not characterized as "critical." In Atlanta, however, needs for research chemists, particularly in university teaching positions, required recruitment throughout a number of southern States to meet the demand.

In Dallas the demand for both chemists and chemical engineers was reflected by the number of unfilled job orders which were carried over by the local employment service in September.

On the West Coast, placement of new graduates during the summer was reported in the San Francisco Bay area. In Portland, chemists were in surplus supply in September, and in Seattle demand was declining.

Some areas, particularly in the Middle West, reported so few employment opportunities for chemists that graduates were migrating elsewhere. Kansas City reported that such a situation had caused graduates in chemistry during the past several years to seek employment elsewhere. The Minneapolis-St. Paul labor market area reported a larger supply of applicants than in September 1957. Graduates in this occupation in Denver were also forced to seek other employment because of the lack of industries in the area utilizing chemists.

Draftsmen

Unfilled job openings for draftsmen placed in interarea clearance throughout the nation rose slightly from a total of 212 in July to 255 in September. The number of such openings was only about one-third of the total of nearly 800 unfilled openings in September 1957. For mechanical draftsmen (see Table II), the percentage increase in unfilled clearance openings was greater than for draftsmen in all other specialties.

In most of the 30 major labor market areas supplying information on engineering, scientific, and supporting technical personnel, the number of available draftsmen registered for employment declined between July and September 1958. Only six of the areas reported increases in the number of draftsmen seeking employment, while about two-thirds of the areas reported important reductions in the number of such applicants. Part of the decline was attributed to the return to school of students, particularly from engineering schools, who had entered the labor market in June or July seeking summer employment as draftsmen.

The supply of available applicants in the 30 labor market areas in September was much greater than the number of available openings listed. Only about 460 openings for draftsmen were reported to have been placed with offices of the public employment service in these areas in September.

The situation reported in Atlanta appears to be typical--"persons having worked as draftsmen outnumbered openings, although workers in some specialties are at a premium." In New York the special qualifications on local office job orders were illustrated by the fact that both engineers and draftsmen with highly specialized experience and a thorough knowledge of such items of electronic equipment as transistors and microwaves were in short supply and generally not available. In Paterson-Clifton-Passiac and in the Newark-Jersey City areas, too, draftsmen generally were in surplus supply. Layoffs were reported in Philadelphia where large consulting engineering firms had separated draftsmen, and in Pittsburgh where the supply of draftsmen was much higher than a year ago. Further reductions in employment were forecast for the area because of layoffs by one of the area's major firms which had already separated 16 of its staff of 55 draftsmen.

Considerably increased demand for draftsmen, particularly for the electronics and aircraft industries, was reported in Dallas. In St. Louis the number of draftsmen being hired by firms in the electronics industry, and by consulting engineering firms in the construction industry, accounted for an increase in the number of job openings for draftsmen. Increased demand was also reported in the Minneapolis-St. Paul area, and in Milwaukee where increases in durable goods employment strengthened demand for draftsmen.

Unfilled job openings for draftsmen more than doubled between July and September in Los Angeles. Peak seasonal activity in construction and renewed demand by shipyards caused declines in the number of unemployed draftsmen in San Francisco. In Portland, even though the supply of applicants was adequate it was noted that some openings remained hard to fill because of special experience requirements.

Laboratory Technicians and Assistants

Relative stability marked the demand-supply situation for laboratory technicians as evidenced by public employment office operations in the period between July and September 1958. Unfilled openings placed in interarea clearance in the nation as a whole rose by about 4 percent and totaled 174 in September. In September 1957 such vacancies for laboratory technicians totaled about the same (see Table II, page 29).

In the 30 labor market areas providing detailed information on the selected occupations, the number of laboratory technicians among active applicants declined from about 3,600 in July to 3,240 in September. Unfilled openings (including those not placed in clearance) in these areas were about the same as at the end of July--near 235.

Declines in the number of applicants were reported in Boston, where the medical technicians' shortage was still serious; in Buffalo, Philadelphia, Indianapolis, where some job orders for chemical assistants, scientific helpers, and medical technicians had been filled; Cincinnati, Detroit, and Los Angeles where the number of applicants declined from 425 in July to 250 in September, and in New York.

Areas reporting increases in the supply of applicants during the period included: Providence, Paterson-Clifton-Passaic, Pittsburgh, Houston, St. Louis, Cleveland, and Denver.

In New York, although the supply of applicants exceeded demand listed with local employment offices, shortages of registered and otherwise highly qualified medical technicians were reported. Experienced technicians with broad scientific training, it was noted, are increasingly in demand because of the greater complexity of diagnostic tests, growth in the use of medical and health facilities by the public, and the expansion of research. Fewer opportunities, however, were available in the area now than one year ago for recent biological science majors or for inexperienced technicians.

Differences in the demand for various types of laboratory technicians, even during a period of relatively little change, is shown in reports from Atlanta where x-ray, medical, and dental technicians, trained by the armed forces, were in surplus supply in September, but technicians with a more extensive background in biochemistry were being sought. In New Orleans the supply of technicians included primarily chemists' assistants and laboratory testers, while hospitals reported a shortage of medical technicians for which a college degree was required. St. Louis also reported an urgent need for laboratory technicians, particularly for hospitals and clinics. Starting salaries in the area for these occupations were considered low, considering the experience and other qualifications required, and some graduates from foreign countries were being recruited and eagerly accepted. In Columbus, also, laboratory technicians and assistants continued in short supply because of the constant expansion of hospital facilities and the numerical lack of adequately trained personnel. Other areas reporting a steady increase in demand for medical technicians included Denver and Seattle.

C. Analysis for Engineers by Area

Boston, Massachusetts

The number of engineering applicants remained relatively stable with a total of about 285 applicants in July and in September. The number of available openings received for engineers, however, rose from 17 in July to 76 in September, chiefly because of orders placed for electrical engineers and industrial engineers by one major employer in the area. Available applicants did not have the experience in electronics or the educational qualifications specified for many of the vacancies. A shortage of civil engineers was somewhat eased by delays in the road-building program. Layoffs of some civil engineers also resulted from such delays. The establishment of two new electronic research laboratories in the area, which were completing their staffing requirements, also created demand for engineering and scientific personnel. (Unfilled openings placed in interarea clearance numbered 28 in September compared with 45 in July.)

Providence, Rhode Island

Eighty engineers were registered for employment in September of whom only about one-half held a college degree. Relatively few vacancies were reported during the period; however, architectural engineers were needed and not available among registered applicants. Some further increases in engineering employment were anticipated, however, during the fall. (Only one opening was placed in interarea clearance in September compared with four in July.)

Buffalo, New York

Shortages of electrical, mechanical and aeronautical engineers continued, with the number of openings on hand in public employment offices at the close of September down slightly to 178 from the July total of about 200. The number of available applicants for engineering vacancies also declined during the period to 115 in September. (Unfilled openings placed in interarea clearance increased from 112 in July to 124 in September.)

New York, New York

Continuing need for electronic engineers, and an increasingly tight labor market for personnel with highly specialized experience in research in solid state physics, and design and development of transistors, radar, microwaves, system engineering, computers, and inertial guidance systems characterized the area in September. Engineers familiar with digital computers and microwaves were two of the main categories of personnel needed, and several large employers maintained continuing orders with the Employment Service for qualified personnel for work on these and various other phases of electronic development.

In the construction engineering field, some firms were laying off engineers and supporting personnel, some firms were leaving the city and relocating their facilities elsewhere, while one organization reported the domestic work had turned down, but overseas projects for which personnel were needed had increased. While industrial construction activity was slow, construction of schools, hospitals, office and apartment houses and some highway construction were expanding. There appeared to be a feeling among construction engineering firms that business and employment would increase in contrast to the opinions held earlier in the year. (The number of active applicants for engineering openings declined from about 1,550 in July to 1,150 in September. Openings placed in interarea clearance dropped from 78 in July to 40 in September.)

Paterson-Clifton-Passaic, New Jersey

The total number of engineering applicants increased from about 200 in July to 235 in September, but the supply of civil engineers was reduced because of increased activity in the construction industry. A slight increase in demand for mechanical engineers was also noted. The need for electronic and mechanical engineers is expected to continue. Orders placed in interarea clearance in September included 8 for electronic engineers and 10 aeronautical engineers with specialized experience. Demand was similiar one year ago, but at that time the supply of available applicants was smaller. (Openings placed in interarea clearance rose from 13 in July to 24 in September.)

Newark-Jersey City, New Jersey

Fewer electrical engineers were available in September than two months ago, but the number of chemical engineering applicants increased. A decline in the number of unfilled openings was noted between July and September. Further expansion, notably in engineering and research activities, is anticipated for the area. (The number of unfilled openings placed in interarea clearance increased during the period, and totaled 14 in September 1958.

Philadelphia, Pennsylvania

The supply of engineers contracted slightly between July and September chiefly because of recalls by some firms which had previously had layoffs, and because of some new hiring commitments. Qualified engineers to direct field teams in the installation and maintenance of computers and data processing equipment for missile guidance systems were being recruited for a major employer in the area. (The total number of registered applicants declined from 517 in July to 448 in September; openings placed in interarea clearance increased from 20 to 48.)

Pittsburgh, Pennsylvania

Engineering applicants declined between July and September. Mechanical engineers comprised the largest group of applicants. Many applicants were actually on layoff status and subject to recall. One year ago only about one-fourth as many engineering applicants were registered for employment compared with the September 1958 total of 421. In view of the opening of a new research facility in the area,increased demand is anticipated for mechanical engineers with educational and experience qualifications in the field of infa-red and ultra-violet spectrometry. (The number of unfilled openings placed in interarea clearance was 20 this September compared with 15 in July, and nearly 100 in September 1957.)

Baltimore, Maryland

Some pickup in the number of engineering applicants was noted, particularly among industrial and mechanical engineers. Little change in demand occurred in the area between July and September except for electronic engineers. Total demand for engineers was below the level of September 1957, but is expected to increase in the next few months with electrical machinery and aircraft industries recruiting electrical and electronic engineers and other types of research engineers. Both the number of job openings received, and the number of unfilled at the end of September, reflect the increase in demand. (Openings placed in interarea clearance remained close to the July level of 24.)

Washington, D. C.

Openings were down slightly from July for civil and electrical engineers. The total number of engineering applicants was below the July level of about 125. Vacancies are frequently for engineers and technical personnel for government employment, including overseas assignments.

The level of hiring by government through the local employment office, however, declined in September. (Openings placed in interarea clearance, including overseas vacancies, totaled about 350 in September compared with about 400 in July.)

Louisville, Kentucky

Out-of-area recruitment of engineering and supporting personnel in the area is continuing. Heavy factory losses during the past two years in metal working and chemicals have resulted in few employment opportunities in the area. Employment of civil engineers in the construction industry and mechanical engineers in metal working industry was chiefly for replacements. (Engineering applicants remained near the July level at about 40; no openings were placed in interarea clearance.)

Atlanta, Georgia

Industrial engineers were the only group considered surplus in the area. As in July, inexperienced engineers in this category were experiencing difficulty in finding employment. Electronic engineers were in short supply, and recruitment was being conducted among other electrical engineering specialties for work in electronics. Civil engineers were in short supply because of the high level of building activity. A large number of job orders were placed on the clearance inventory chiefly for electronics engineers by one major firm in the communications industry which was recruiting engineers in several southern States at the close of September. (Active engineering applicants number about 90; only three openings were placed in the interarea clearance system in mid-September.)

New Orleans, Louisiana

Decline in demand for engineers was evident between July and September partly as a result of the cessation of recruitment by the Corps of Engineers. A slack in various industries--construction and oil exploration activities as well as in shipbuilding--and the temporary halt in the expansion programs for chemical and aluminium products, accounts forthe increase in active applicants. Demand by the U. S. Corps of Engineers, reflected in the number of unfilled openings placed in interarea clearance in September 1957, no longer exists. Openings placed in clearance numbered 23 in September 1957 compared with only one in September 1958. A small decrease in active applicants since July was the result of some call backs, especially among civil and electrical engineers, and the withdrawal from the labor force of some applicants to resume further study.

Houston-Baytown, Texas

No appreciable change in the demand and supply of engineering personnel was noted in the area between July and September. An increase in engineering employment anticipated in July did not occur. The number of active engineering applicants declined slightly in September to about 195, but this was chiefly due to recruitment by employers from other areas, particularly for aircraft employment. (Only two openings were placed in interarea clearance in September 1958.)

Dallas, Texas

A decline in the supply of industrial and mechanical engineers occurred between July and September as a result of an increase in hiring and because of some out-migration of applicants. In-migration for engineering and other selected occupations dwindled. Increased demand for electronic and mechanical engineers came chiefly from defense plants in the area producing aircraft and electronics. At the same time demand declined for metallurgical, civil and mechanical engineers. Because of shifting emphasis in various phases of contract activity the number of unfilled jobs carried over from the previous month increased for several engineering occupations. (The number of active applicants declined from about 125 in July to 90 in September; no openings were placed in interarea clearance.)

St. Louis, Missouri

Openings continue to be chiefly for engineers for employment in aircraft and electronics, but demand also continued for sales engineers with refrigeration experience. Demand for chemical engineers showed an increase, but was accompanied by a decline in demand for chemists. The need for engineering personnel is not critical and is less acute than one year ago. (The number of engineering applicants on file was close to the July level of 110. Few openings were placed in interarea clearance in either July or September.)

Kansas City, Missouri-Kansas

There are instances of shortages of engineers in the area who have specialized training and experience. As demand for these selected occupations has lessened in the labor market, however, turnover appears to have fallen to a minimum. (Active applicants numbered about 40 in July; few openings were placed in interarea clearance.)

Indianapolis, Indiana

The number of available applicants with college degrees was reduced from 33 to 15 due to some recalls, some new hiring by local industries, and to recruitment by out-of-State firms. There were no applicants in the area at the end of September who held college degrees in either the aeronautical or chemical engineering specialties. The number of applicants with degrees in the mechanical engineering classification dropped sharply between July and September. (Few openings were placed in interarea clearance.)

Cincinnati, Ohio

A smaller number of openings for electrical engineers were reported in September. This appears to be rather because of the lack of qualified applicants than because real demand has declined. Two major employers in the area are continuously seeking engineers with certain specialization and training for defense-related contracts and many of these positions are for supervisory personnel. (The number of active engineering applicants declined from about 65 in July to 30 in September; the number of openings placed in interarea clearance declined from 34 in July to 6 in September.

Columbus, Ohio

No significant change in the demand-supply status of the selected occupations is anticipated in the area until industrial plant capacity reaches the production levels of one year ago. A moderate upturn in manufacturing activity is anticipated over the next few months and the staffing of a new electrical machinery plant now under construction is expected to stimulate demand. (The number of active engineering applicants increased from about 50 in July to nearly 60 in September; openings placed in interarea clearance remained at the July level of 14.)

Cleveland, Ohio

No significant employment changes occurred between July and September although total applications from engineering personnel declined during the period. A general pickup in employment occurred but most of the increase has been from recalls of employees who were laid off. The relatively lower pay scale for current openings conflicts with the requirements of more rigid training and higher educational qualifications. One year ago, the effect of the recession was already being felt as previous orders for job openings were withdrawn. The number of applicants at that time, however, was still relatively low. (Orders placed in interarea clearance remained very low--only seven in September 1958, compared with 100 in September 1957.)

Detroit, Michigan

The number of applicants, particularly in the aeronautical engineering classification, increased between July and September. Layoffs by many major employers were at their peak in August and mid-September. The cancellation of missile contracts and revision of employment requirements accounts for the decline in the number of openings received in September. (Unfilled openings placed in interarea clearance declined from about 275 in July to about 125 in September.)

Chicago, Illinois

The number of registered applicants, chiefly in the industrial engineering classification, declined sharply, partly as a result of the return to school of some applicants registered for summer employment in July. Even where applicants are available, rigid job specifications prevented filling some of the job openings. The number of openings received increased slightly due to increased recruitment of mechanical engineers. Salaries offered on listed job openings in the area are lower than last year. (The number of active engineering applicants declined from about 500 in July to 435 in September; unfilled openings placed in interarea clearance remained close to the July level of about 25.)

Milwaukee, Wisconsin

The supply of workers in chemical, industrial and mechanical engineering specialties increased moderately between July and September. At the same time, applications of civil and electrical engineers decreased by a small amount. Demand as reflected in job orders showed a small gain for engineers. For only metallurgical and electrical engineers, however, is the shortage described as "critical." It is estimated that about 10 percent of all engineering applicants listed are at work but seeking new jobs. Rigid hiring specifications have made placements difficult. In September the total volume of placements was up slightly but well below the level of one year ago. An upturn during the summer in durable goods employment strengthened demand for engineers and supporting personnel. Government units in the area do not indicate a significant need for personnel in the selected occupations during the next few months. One major employer of such personnel has suspended hiring because of a work stoppage, but in the future will again be actively seeking electrical and mechanical engineers for research and development projects on airborn servo mechanisms, computing devices, and navigational computers. (Active engineering applicants numbered about 190 in September; unfilled openings placed in interarea clearance increased from more than 30 in July to more than 40 in September.)

Minneapolis-St. Paul, Minnesota

Active applications declined by about 12 percent between July and September to a total of about 145. The decline was the result of the return to school of some applicants and also to "a little spurt in employment" in the area. The number of active applicants was nearly double the September 1957 total with the greatest increase occurring in the electrical, industrial and mechanical engineering occupations. Few engineering openings for employment were received during September. The number was only about one-half as high as in July. However, at the end of September unfilled openings were up slightly. Layoffs among engineers by one major employer in the area were anticipated during the fall. In September 1957 there was a strong demand for mechanical engineers and in general the number of available job openings for engineering personnel was increasing. In contrast, however, demand for civil engineers was higher during the current year with more unfilled orders for such personnel in September 1958 and fewer applicants than in September 1957. (Orders placed in interarea clearance increased from about 30 in July to about 40 in September.)

Denver, Colorado

At present many classifications of engineers are in surplus supply, but over the next few months demand is expected to increase, particularly for civil and aeronautical engineers. At present the surplus electrical engineers registered have specialization in electrical design of commerical and industrial power transmission and distribution equipment, while the current need is for electronic designers with aircraft or missile design experience. (The number of active engineering applicants declined from 156 in July to 125 in September; unfilled openings placed in interarea clearance remained at the July level of 127.)

Los Angeles, California

A large employment order for electronic engineers reported in July was cancelled in August and reinstated in September. The number of openings for mechanical engineers was smaller in September than in July, but this occupation constituted the most critical shortage in the area. The total number of unfilled openings rose between July and September, chiefly because of the demand for electronic and aeronautical engineers with specialized experience and advanced degrees. Chemical engineers were also on the shortage list in September. Unfilled job vacancies placed in interarea clearance rose in September because of the substantial increase in demand for electrical or electronic engineers. The level in September 1958 was much above that of one year ago when sharp cutbacks occurred in aircraft employment.

The number of engineering applicants dropped from about 1,200 in July to about 1,100 in September 1958 with fewer registered in all occupations except civil engineering. Many persons, particularly among those in related technical occupations, who registered in July withdrew from the labor market to return to school. (Unfilled openings placed in interarea clearance increased from about 340 in July to about 455 in September 1958 compared with only 85 in September 1957.)

San Francisco-Oakland, California

Demand for engineering personnel declined between July and September, and was definitely less than in September 1957. In some specialties, however, increases in demand tended to draw off all well-qualified workers; for example, in September very few registered electrical engineers were available with electronics specialization. One employer reported all applicants responding to a newspaper advertisement he placed, who had the required qualifications, were employed and merely job shopping. The number of mechanical engineers seeking employment has also declined in the area. In some occupations such as chemical engineering where job opportunities have been scarce, out-migration is known to have reduced the supply of available applicants. The only expansion now foreseen which will require engineering and scientific personnel will occur in the fields of electronics and nucleonics. Even for these fields, expansions will be small in terms of numbers. The effect on demand of steady improvement in the area's economy will be counterbalanced by contractions arising from seasonal factors which will chiefly affect civil engineers and supporting personnel. (The number of available engineering applicants declined from about 430 in July to 330 in September; as in July only five unfilled openings were placed in interarea in September.

Portland, Oregon

The number of available applicants declined between July and September, but declines in demand were evident, particularly for civil engineers following peak demand for construction and governmental agencies during the summer. A small number of openings for electrical engineers of a highly specialized nature were unfilled because available applicants, many of whom possessed engineering degrees, were unable to meet the special qualifications. (Available applicants numbered 56 in September compared with 66 in July; few openings were placed in interarea clearance.

Seattle, Washington

Only 26 active applicants for engineering occupations were available in the area in July and only about one-half of these held college degrees. While the number of new engineering vacancies was relatively small, a very large number of unfilled vacancies reported in July were mostly still available in September. This unfilled demand--greater than for any other area included in these reports--was primarily for the aircraft industry. The relatively small supply of available engineers in the area also affected the construction industry, including demands of the State government for engineers for the highway department. (The total of 885 unfilled openings placed in interarea clearance in September 1958 was the same as in July.)

III. Excerpts from An Appraisal of Short-Run Manpower Requirements and Supply Indicators by William H. Chartener, McGraw-Hill Publishing Company 1/

Note: The paper presented by Mr. Chartener, from which the following excerpts have been taken, reviews and evaluates available information on the short-run supply and requirements for scientific and engineering manpower. The excerpts included below have been selected because they provide supplementary information on the current labor market situation for scientists and engineers from sources other than the Bureau of Employment Security and its affiliated State employment security agencies. None of the excerpts relate to information included elsewhere in this report, although in his full paper, Mr. Chartener presented a detailed description of such data as published both in The Labor Market and Employment Security and in the present series of reports on Current Labor Market Conditions for Engineering, Scientific and Technical Personnel, and described them as "increasingly useful sources" of information.

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Recruitment Advertising The huge volume of enticing display advertisements soliciting applications for engineering and other technical employment in the last few years has frequently been cited--and almost as frequently ridiculed--as evidence of a shortage of technical manpower. . . Thus, it is that the amount of help-wanted display advertising in the New York Times--and especially its Sunday editions--has gained a reputation as a gauge of demand for technical manpower. The Times itself has maintained a monthly count of the lines of help-wanted display advertising in daily and Sunday editions, most of which is for technical personnel, only since the beginning of 1957. . . The trend is display advertising in the Sunday Times was generally rising during 1955 and 1956, the number of columns being more than twice as great at the end of 1956 as in early 1955. Advertising declined sharply through 1957, then rose during 1958. There are occasional erratic peaks in months with five Sundays. . . but the general trends through the past four years are clear.

A similar gauge of demand for technical personnel can be constructed from employment advertising in professional journals and technical magazines. Employment advertising in McGraw-Hill domestic publications, tabulated quarterly, shows an almost uninterrupted climb from 162 pages in the second quarter of 1954 to 663 pages in the last quarter of 1956, a sharp drop through 1957 to 187 pages in the first quarter of 1958, and a moderate rise in the remaining three quarters of 1958. . .

1/ Paper presented at the Conference on Scientific Manpower held during the Annual Meeting of the American Association for the Advancement of Science, December 30, 1958. Washington, D. C.

Throughout this period of five years, more than 60 percent of the employment advertising in the 26 or more McGraw-Hill publications appeared in Aviation Week and Electronics. The preponderance of employment advertising in these two publications may indicate greater reliance on this manner of recruiting by defense contractors than by other employers, or it may simply reflect the extraordinarily heavy demand for technical manpower for defense research and production in the past few years.

Employment advertising in Chemical and Engineering News shows a similar pattern of fluctuations in demand for chemists. (According to a recent article 2/ the number of) column inches of "situations open" advertising trebled between the summer of 1954 and the summer of 1956, and dropped just about as sharply in the summers of 1957 and 1958. Year-end issues for 1958 show a reversal of the decline in "situations open" advertising, indicating increased demand for chemists. "Situations wanted" advertising has shown an opposite pattern, falling in 1955 and 1956 and rising in 1957 and 1958. Throughout the 1950's, "situations wanted" advertising has remained at a very low level compared with "situations open" advertising.

(Other sources of recruitment information include Careers for College Men published by Careers, Inc., and the College Placement Annual, but neither of these sources is as sensitive to changes in manpower requirements as the other advertising media mentioned.)

(Information obtained by various placement services including professional societies such as the American Chemical Society also reflect the current demand and supply situation. For example, this organization conducted 4,375 known interviews at the Chicago meeting in September 1958.) Changing ratios of employer representatives to applicants registered for these National Clearing House interviews reflect the employment market for chemists. At the spring meetings the employers-to-applicants ratio rose from about 3-to-4 in 1953 steadily to about 3-to-1 in 1957, then dropped to 1-to-1 in the spring of 1958. At the fall meetings, there was a jump in the ratio from less than 1-to-1 in 1954 to over three employer representatives per applicant in 1955, then declines in 1956 and 1957, with a small rise to 3-to-2 in the fall of 1958.

ACS also maintains Regional Employment Clearing Houses in its offices in New York, Chicago and Washington. Applicants file records of training and experience and these are reviewed by employers who visit the

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2/ Chemical and Engineering News, Vol. 36, No. 52, December 29, 1958, pp. 74-77.

regional offices. Employer visits may be interpreted as an indicator of requirements. There was a rise of over 50 percent from 1953 to 1956, a drop in 1957 and a small rise in 1958. Applicants' records on file show a decline of one-half from 1954 to 1956 and a rise in 1957 and again in 1958, though the number of applications on file has remained steady since March.

The surveys of Demand for Engineers conducted since 1951 by the Engineering Manpower Commission of the Engineers Joint Council have been an increasingly valuable source of information regarding the engineering employment market. The latest survey report, which has just been completed, provides a good deal of new data in addition to the familiar information on expected accessions.

This year's survey was conducted last summer. Questionnaires were mailed to a broad sample of industrial firms and government agencies about June 1. Replies received by September 30 (the cutoff date) came from employers of over 200,000 engineers, almost 175,000 of whom are identified as engineering graduates. The sample covers about 25 percent of total engineering employment. The central questions in the survey concern "net accessions" (hires minus losses) during the survey year. Employers are asked to report their "expected" net accessions and also their "required" net accessions, each expressed as a percentage of the number of engineers employed at the beginning of the year. Usually, employers have reported that they expected to hire fewer new engineers than they actually required, which is taken as an indication of a deficiency in supply. . . (The percentage of expected net accessions of engineering graduates in 1958 was 5.8 compared with 7.4 in 1957; required net accessions were 6.6 percent in 1958 compared with 12.1 percent in 1957.)

(The estimate of recruiting new as well as experienced graduate engineers is based on a sample of industrial companies and government agencies employing 156,750 engineering graduates at the beginning of 1958. It showed an expected hiring of 11,088 new graduates in 1958 compared with the actual hiring of 11,504 in 1957, and expected hiring of 12,013 experienced graduates compared with actual hiring of 13,101 in 1957.)

(One of the pioneers in the use of surveys to indicate trends in demand for engineers, and other college graduates, is Frank S. Endicott, Director of Placement at Northwestern University.). . . The survey has been broadened in scope in recent years, making it increasingly useful to analysts of the employment market. The basic questions concern the recruiting plans of some 200 large and medium-sized companies that are active in recruiting college seniors. . . In the 1957 survey, for example, 192 companies reported that they had hired 7,419 engineers in the class of '56 and planned to hire 10,120 in the class of '57. But in the 1958 survey, 212 companies said they had hired only 5,665 engineers in 1957, a little over half the planned hires. These 212 companies planned to hire 5,650 engineers in 1958, but 184 companies responding in the new 1959 survey say they actually hired 5,866 engineers. The 184 companies expect to hire 6,762 in the current 1959 recruiting season.

The Endicott Surveys have their limitations. They apply almost exclusively to the market for the current year's new graduates, not to the entire employment market. The number of companies in the sample is only about 200--though these companies probably hire about one-fifth of the available new graduates in engineering. And there may be important changes in hiring plans between survey time in November and graduation time in June, as evidently happened in 1957. (In the last few years there have been several other surveys of college placement of graduates in engineering and other technical fields. The Midwest College Placement Association conducts an annual recruiting survey that is reported in the Journal of College Placement and the placement offices of many leading engineering schools also issue public reports of recruiting activity among graduating engineers.)

IV. Appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Bureau of Employment Security, Office of Program Review and Analysis. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is an Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

A summary of information on clearance openings in all States has been utilized in the preparation of the bimonthly reports entitled Local Shortages in Selected Scientific and Engineering Occupations prepared at the request of the National Science Foundation.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas 1/ for the first time in May 1958. These area labor market reports provide bimonthly information on local economic factors contributing to changing demand-supply relationships for engineering, scientific and technical personnel in the area. Insofar as possible other sources of information are utilized including occupational information from labor market areas.

1/ The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), Engineers, chemical (0-15), Engineers, civil (0-16), Engineers, industrial (0-18), Engineers, mechanical (0-19), Engineers, aeronautical (0-19.03), Engineers, mining (0-20), Chemists (0-07), Natural Scientists, n.e.c. (0-35), Draftsmen (0-48), and Laboratory Technicians and Assistants (0-50). A list of the 30 areas appears on page 27.

List of 30 Major Labor Market Areas

Boston, Massachusetts
Providence, Rhode Island
Buffalo, New York
New York, New York
Paterson-Clifton-Passaic, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Baltimore, Maryland
Washington, D. C.
Louisville, Kentucky
Atlanta, Georgia
New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas
St. Louis, Missouri
Kansas City, Missouri-Kansas
Indianapolis, Indiana
Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Detroit, Michigan
Chicago, Illinois
Milwaukee, Wisconsin
Minneapolis-St. Paul, Minnesota
Denver, Colorado
Los Angeles, California
San Francisco-Oakland, California
Portland, Oregon
Seattle, Washington

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-November 1958

Month and Year	All Occupations	Professional and Managerial	Selected Occupations			
			Total	Engineers	Scientists	Draftsmen & Technicians
Jan. 1956	27,887	12,845	6,844	4,792	476	1,576
Jan. 1957	35,629	14,498	9,327	6,349	723	2,255
March	34,390	15,952	9,330	6,428	762	2,140
May	31,452	14,007	8,434	5,976	606	1,852
July	29,144	11,879	7,467	5,437	650	1,380
Sept.	23,208	8,986	5,506	3,946	595	965
Nov.	13,859	5,388	2,908	1,993	323	592
Jan. 1958	14,665	7,726	2,634	1,817	297	520
March	14,451	8,244	3,563	2,717	465	381
May	15,552	9,439	3,572	2,764	397	411
July	14,420	7,514	3,584	2,921	277	386
Sept. R/	15,363	8,732	5,498	4,447	626	425
Nov. P/	17,661	9,308	4,922	3,925	593	404

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

R/ Revised
P/ Preliminary

Table II. Clearance Openings in Selected Occupations September 1958, July 1958 and September 1957

Occupation	Sept. 1958	July 1958	Sept. 1957	Percent change to Sept. 1958 from: July 1958	Percent change to Sept. 1958 from: Sept. 1957	Percentage Distribution September 1958
All selected occupations	5,498	3,584	5,506	+53.4	-0.1	100.0
Professional						
Engineers, total	4,447	2,921	3,946	+52.2	-12.7	80.9
Metallurgical	22	31	96	a/	-77.1	0.4
Chemical	54	50	200	+8.0	-73.0	1.0
Civil	799	794	321	+0.6	+148.9	14.5
Electrical	1,750	994	1,488	+76.1	+17.6	31.8
Industrial	156	136	223	+14.8	-30.0	2.8
Mechanical (except aero.)	1,033	648	1,162	+59.4	-11.1	18.8
Aeronautical	633	267	440	+137.1	+43.9	11.5
Mining	0	1	16	a/	a/	0
Other professional	626	277	595	+126.0	+5.2	11.4
Physicists	156	67	189	+132.8	-17.5	2.8
Mathematicians	163	70	124	+132.9	+31.5	3.0
Chemists	79	61	173	+29.5	-54.3	1.4
Life scientists	24	24	67	a/	a/	0.4
Writers, tech. pubs.	195	44	26	+343.2	+650.0	3.5
Physical scientists	5	6	6	a/	a/	0.1
Statisticians	4	5	10	a/	a/	0.1
Semiprofessional						
Draftsmen, total	255	212	791	+20.3	-67.8	4.6
Mechanical	62	38	275	+63.2	-77.5	1.1
Other	193	174	516	+10.9	-62.6	3.5
Laboratory technicians and assistants, total	170	174	174	-2.3	-2.3	3.1
Medical technicians	118	118	84	0	+40.5	2.1

a/ Percent change not shown where both absolutes are less than 50.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

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# CURRENT LABOR MARKET CONDITIONS
for
Engineering, Scientific, and Technical Personnel

JANUARY 1959

UNITED STATES DEPARTMENT OF LABOR
James P. Mitchell, Secretary
BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

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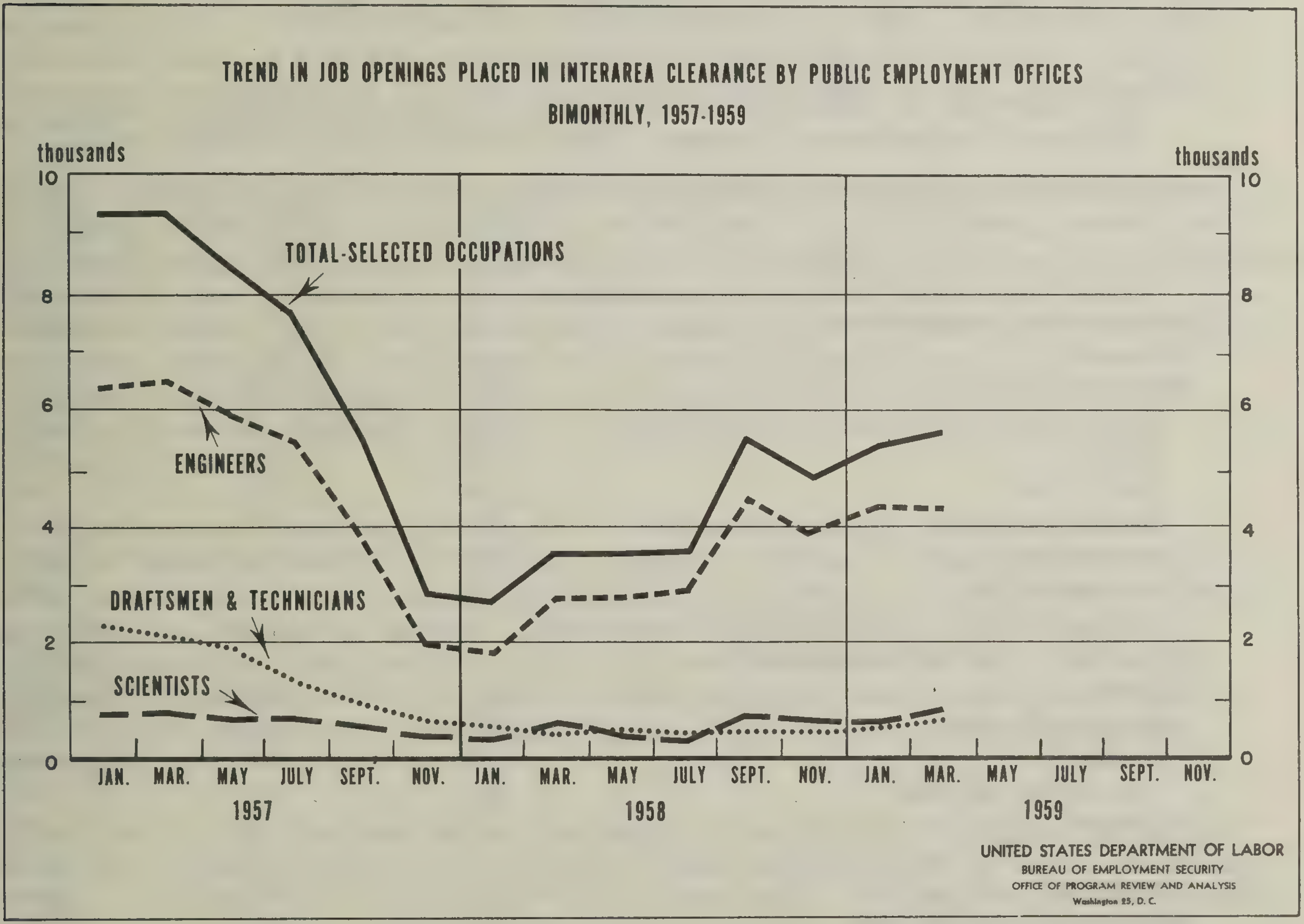
This is the fourth in a new series of bimonthly reports prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It consists mainly of summaries of field reports on current conditions in 30 major labor market areas and statistics on job openings for selected engineering, scientific and technical occupations placed in interarea clearance by public employment offices throughout the country.

CURRENT LABOR MARKET CONDITIONS FOR ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

I. Highlights of Interarea Recruitment Activity - January 1959

Job openings placed in interarea clearance for the selected engineering, scientific, and technical supporting occupations totaled 5,545 in January, nearly equal to the previous year's high month of September. Unfilled openings increased by more than 600 from the total of 4,924 in November 1958, chiefly because of increases in unfilled openings for engineers, draftsmen and laboratory technicians.



TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES

BIMONTHLY, 1957-1959

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

Unfilled job openings for engineers were placed in interarea clearance by nearly all States. For example, 40 States listed vacancies for electrical engineers, 35 States listed vacancies for mechanical engineers, and 25 States had unfilled openings for civil engineers in January 1959. An increased number of vacancies for electrical engineers in New York resulted from job orders placed with the employment service from the communications and missiles industries.

About 135 more unfilled openings for draftsmen were reported in January 1959 than in November 1958. Only a small increase of about 10 vacancies was recorded for laboratory technicians in the same period. The year-to-year change, however, in the number of unfilled openings placed in interarea clearance for this occupation was very small.

Job Openings in Interarea Clearance - Public Employment Offices
Selected Occupations, January 1959, November 1958, January 1958

	Jan. 1959	Nov. R/ 1958	Jan. 1958
All selected occupations	5,545	4,924	2,634
Engineers, total	4,386	3,906	1,817
Chemical	87	57	150
Civil	676	784	346
Electrical	1,746	1,584	590
Industrial	179	174	128
Mechanical 1/	937	762	425
Aeronautical	722	534	126
Selected scientific occupations	608	610	297
Physicist	177	194	53
Mathematician	161	137	34
Chemist	89	86	109
Technical writer	119	135	52
Other 2/	62	53	49
Draftsman	377	243	315
Laboratory technician	174	165	205

1/ Mechanical, except aeronautical
2/ Includes other natural scientists, n.e.c.

R/ Revised

II. Trends in Labor Demand-Supply Situation by Occupation and Major Area - November 1958

A. Summary

Selective shortages of engineering, scientific, and supporting personnel in a number of labor market areas throughout the country, marked the period between September and November 1958. Demand for mathematicians, physicists, electronic and aeronautical engineers, and draftsmen with experience in the design of electronic equipment, and medical technicians increased during the period, with these occupations most frequently reported as in short supply. Employer requirements were generally considered to be higher than a year earlier, with specialized experience and specific educational qualifications among the major prerequisites for filling job openings. Age limitations appeared to be more frequently mentioned in the job specifications, especially among engineers.

Over one-half of the 30 major labor market areas supplying information on the group of selected occupations reported one of the following conditions--increased demand for such personnel between September and November; a continuing shortage in one or more of the occupations with fewer qualified applicants available; the recall of former engineering and specialized personnel; a sizable increase in the number of job openings at the end of November, compared with the September total; or that the number of unfilled openings in these occupations which were placed in interarea clearance had increased.

In eight areas there was little or no evidence of any change in conditions between September and November 1958. In four of these, job orders were scarce, or the supply of applicants continued to exceed demand. They included the following areas: Providence, Pittsburgh, Houston-Baytown, and Kansas City. Shortages, particularly of aeronautical and electrical engineers, continued in St. Louis, Dallas, Denver, and Seattle, but there were no indications that any significant change had occurred during the period.

A decline in job openings or an increase in the supply of available applicants and relatively little change in demand was reported by the following areas: Washington, D. C., Louisville, Cincinnati, Los Angeles and Portland.

The major change in engineering employment conditions during these months was a decline in the number of available applicants. This was partly attributed to improved economic conditions which resulted in the recall of some workers previously placed on layoff status. Job openings placed in interarea clearance for all types of engineers in offices of the employment service throughout the country showed a small decline of about 500 openings. For the 30 major labor market areas reporting separately, the total number of unfilled openings remained almost unchanged between September and November.

Applicants in the natural sciences declined in these areas, while demand, as measured by job openings unfilled at the end of the month were somewhat higher in November than in September. Seattle, Buffalo, Washington, D. C. and Los Angeles were labor market areas in which most of the unfilled openings existed. Openings placed in interarea clearance throughout the nation showed almost no change, remaining at a total of about 265 openings in both months. The major change within the group of scientific and other professional occupations was an increase in the number of unfilled openings for physicists and life scientists, and a decline in the number of such openings placed in interarea clearance for technical writers and mathematicians (see Table II).

While the supply of chemists in the 30 major labor market areas showed a decline, the number of unfilled openings in these areas for chemists changed very little between September and November. Only two areas placed a sizable number of openings for chemists in interarea clearance because they could not be filled locally. A surplus of applicants and relatively little demand, except for replacements with specialized experience, characterized all except 2 of the 30 major labor market areas.

Applicant files for draftsmen declined sharply over the period from a total of 8,300 applicants in September to 6,880 in November for the 30 major labor market areas covered. New York and Detroit reported the largest number of applicants in the latter month. Reductions in the number of available draftsmen occurred as a result of call-backs in a number of areas including: Paterson-Clifton-Passaic, Philadelphia, Atlanta, New Orleans, Dallas, and San Francisco. Few changes occurred in the number of hard-to-fill openings for draftsmen which were placed in interarea clearance.

The supply of available laboratory technicians exceeded demand in many of the 30 areas, but where unfilled openings could not be met from the local supply, the skills needed were most frequently in the medical and health fields. The number of applicants in the 30 major areas applying for jobs in this occupation declined from 3,475 in September to 2,900 in November. Only seven areas reported an increase in applicants. Openings unfilled at the end of November in these areas totaled 372, compared with 293 in September, but the number of such unfilled openings placed in interarea clearance showed no increase over the period.

B. Analysis by Major Occupation

Engineers

Between September and November 1958, the number of applicants in the engineering specialties moved downward. In the 30 major labor market areas supplying information for this report about 1,000 fewer engineers were listed in the files of the local employment offices as "active applicants" than were listed in these same areas in September 1958. The decline was not confined to a small number of areas, but was widely distributed geographically across the country.

Several factors accounted for the decline, but the general improvement in business activity was noted by a number of the area reports. The improvement was believed to have been primarily responsible for the recall of engineers by former employers. Some increase in employment occurred as a result of the award of new contracts, particularly in aircraft and missiles, but more frequently such contracts were mentioned as a factor in an anticipated increase during the coming months, rather than as the cause of the improvement between September and November. Finally, the return of student applicants to school, who had in some cases registered for employment during the summer months resulted in the removal of all such applicants from the active files of a number of the local employment offices. In other areas the length of time for which applications were considered "active" was reduced, thereby reducing the number of applicants reported in November.

Relatively few areas reported any increase in engineering applicants. These few included--Buffalo, New York, Washington, D. C., and Seattle, Washington. In Baltimore, New Orleans, Indianapolis, and Portland the difference in the number registered was not large enough to be considered significant.

Unfilled openings placed in interarea clearance for the 30 major labor market areas remained relatively stable throughout the period with both the September and November total near 2,400. For the nation as a whole the number showed a small decline of about 500 fewer openings for engineers in November than were placed in September 1958 (see Table II).

Nearly one-half of the major labor market areas reporting separately showed increases in the number of unfilled job openings on hand at the end of November, over the similar total reported in September. The total of such openings unfilled at the close of November was higher in 12 of the 30 areas, nearly the same in 10 areas, and smaller in 8 of the areas, thereby indicating the extent of divergence among different parts of the country in the employment picture for the engineering occupations.

Natural Scientists and Selected Professional Personnel

In the natural sciences the total number of applicants registered for employment, in the 30 major labor market areas covered separately in this report, declined by 226 between September and November 1958 to a total of 715. The amount of the decline was significant in the following areas: Boston, New York, Newark-Jersey City, New Orleans, Houston, Chicago, and Los Angeles. In other areas little or no change in demand and supply were evident from operations of the local employment office. Shortages, especially of mathematicians and physicists were widespread, and it is likely that the summary of supply situation for these occupations carried in a special report from the San Francisco area may have been representative of many other areas as well:

> "The market for fully qualified natural scientists of the type for whom job opportunities exist in research establishments, schools and plants of this area, never was greatly affected by recession nor has it changed appreciably during the subsequent recovery. These workers, few in number, have continued consistently in shortage when the few job openings where they were needed have opened. Local office experience with workers from the natural sciences has been too limited for generalizations beyond noting that the supply of applicants in these classifications rose in summer with the availability of summer graduates, and that since July the available supply has decreased. University sources report no surplus of well qualified people in classifications needed locally even though the Bay Area, characteristically, attracts scientists more readily than can many other localities."

A total of only 44 job openings in these occupations were reported to have been received by local employment offices in these 30 areas during November, compared with 62 in September 1958. In November new openings were reported by a larger number of the areas, while in September the total was concentrated in New York and Los Angeles.

Demand, as reflected in the total number of openings which were placed in interarea clearance because they could not be filled locally, remained almost unchanged between September and November. More than two-thirds of the openings placed in interarea clearance were in Seattle where the aircraft industry was recruiting natural scientists, especially mathematicians and physicists. Washington, D. C. was the only other area which placed more than 10 openings for natural scientists in interarea clearance in November.

The lack of suitable applicants for openings in this occupation was noted in a number of the areas. When reporting a shortage of applicants, it was emphasized that the shortage was acute for certain specialists--particularly mathematicians and physicists. Buffalo reported such a shortage and in Boston the shortage was chiefly of physicists. Dallas and Seattle also reported shortages of qualified mathematicians and physicists.

In some areas the problem was one of mismatching of various specialties against job openings. For example, in Indianapolis it was reported that the natural scientists registered were geophysicists and bacteriologists while demand was chiefly for physicists with specialized experience in avionics. In Milwaukee the settlement of a strike of production and tool room workers by one of the area's major producers resulted in a resumption of hiring a limited number of natural scientists.

Fluctuation in employment for natural scientists has been less extreme than for engineers. Even though much of the recent growth in demand for natural scientists has been in industry, the largest numbers in this occupation are employed in educational institutions where the change in employment levels is more gradual. A shortage of scientists for educational institutions and the transfer of such personnel is noted in the following comments contained in the report of labor market conditions in Portland.

> "In the field of education the supply of qualified mathematicians for high schools has become very limited as colleges syphon off qualified teachers. In turn, high schools reach down into junior high for math teachers, and elementary schools are sometimes forced to hire on emergency certificates. This situation is not critical in the city of Portland or its immediate vicinity, but in the far reaches of the four-county area where salary schedules are lower and teachers are not locally available the shortage of qualified math, physics, and chemistry instructors promises to become a growing problem. There is a shortage of applicants with doctorate degrees in the natural science field to adequately meet the needs of area colleges. Although the demand for natural scientists in private industry and civil service is currently being met, growing shortages are expected to develop in education."

Throughout the nation the number of unfilled openings placed in interarea clearance for scientific occupations, including chemists, remained nearly stable between September and November with a total of 610 openings in the latter month (see Table II). The number of unfilled openings for physicists increased from 156 to 194. A decline occurred in job vacancies placed in clearance for mathematicians and for technical writers and publishers.

Chemists

Chemists filing applications for employment in local employment offices of the 30 major labor market areas covered by separate reports declined by about 200 from a total of 1,135 in September to 922 in November. The supply of chemists appeared to be greater than demand in nearly all labor market areas, although some jobs for chemists were vacant because no applicants possessed the specialized experience required.

In St. Louis it was noted that there had been a decrease in demand for chemists and an increase in demand for chemical engineers. Frequently, as reported in the information from Chicago, job orders may specify applicants with either a degree in chemistry or chemical engineering, who for example, have had experience and background in research in heavy inorganic chemicals for research work in corrosion mechanisms and the development of coating for metals.

A surplus of applicants, and relatively little demand except for replacements with specialized experience, characterized nearly all of the areas except Chicago and Portland. In the latter area a research laboratory reported a shortage of qualified research chemists, and it was noted that limited employment opportunities in the area had caused applicants possessing such experience and training to gravitate to research centers elsewhere.

While the number of unfilled openings in the 30 labor market areas remained nearly stable between September and November, the number of hard-to-fill vacancies placed in interarea clearance in these areas increased from 33 in September to 55 in November 1958. Los Angeles and Cincinnati reported the largest number of openings which could not be filled locally.

For the nation as a whole openings for chemists which could not be filled locally and were placed in interarea clearance increased from 79 in September to 91 in November 1958.

Draftsmen

Little change occurred in the number of hard-to-fill vacancies for draftsmen placed in interarea clearance by local employment offices for either the 30 areas separately reporting such information, or in the nation as a whole. The total of all such openings stood at 255 in September 1958 and at 243 in November. Among the 30 labor market areas furnishing special occupational information, 15 vacancies were reported in Boston, where naval and marine draftsmen were in short supply. Kansas City and Philadelphia also reported significant but smaller numbers of unfilled job orders for draftsmen.

Some of the employment offices reporting separately on these occupations noted that their applicant files had been reduced by the elimination of the records of students seeking only summer employment. Total applications for draftsmen in the 30 labor market areas combined dropped from 8,300 in September to 6,880 in November, a decline of 1,420 active applicants. Of this total about 10 percent held a college degree.

The largest number of applicants were reported by the New York area where more than 1,280 were on file. Detroit reported nearly 1,000 applicants--down slightly from the September level.

Even in the supporting occupations, specialized training and experience requirements appeared to characterize the small number of vacancies. As noted in the Seattle report on labor market conditions in that area for draftsmen in November, "Demand is less than supply. Run-of-the-mill draftsmen are plentiful. It is the draftsman who has been trained in a particular branch of industry, with a knowledge of that industry's terms, idiosyncrasies, operations, that is in demand--for that individual job. These draftsmen are in the nature of specialists. . ."

Reductions in the supply of available applicants were reported in several areas. In the Paterson-Clifton-Passaic labor market area draftsmen showed the greatest recovery of any of the selected occupations included in this report. The supply of available applicants was reduced in Philadelphia as a result of call-backs, and in Atlanta the supply of draftsmen had been sufficiently reduced so that the occupation was no longer characterized as "surplus." In New Orleans the supply had also declined and several specialized job openings were unfilled because of experience requirements. However, a "modest" shrinkage of demand for draftsmen occurred between September and November in Dallas. In Minneapolis and in Portland seasonal factors contributed to an increase in the supply of draftsmen. The reverse situation was reported in San Francisco, where surpluses of qualified draftsmen had been declining since May.

Specialized categories of draftsmen were in demand in a number of areas. In Boston, marine and naval draftsmen were in short supply; architectural draftsmen were needed in Atlanta, New Orleans and Portland; and map draftsmen in Chicago. On-the-job training programs for qualified students were being conducted by employers in St. Louis, Chicago, and Seattle. In Denver it was noted that while the overall supply of draftsmen and designers continued to be in excess of demand, in some specialized fields such as aeronautical, mechanical, electrical and piping, the local supply was expected to decrease rapidly in the event of an upturn in the economy.

Changing levels of production in basic industries in some areas contributed to changes in the level of demand for draftsmen. The flourishing construction season and increasing demand at local shipyards and electronics plants reduced surpluses of draftsmen in the San Francisco-Oakland area. In the Paterson area a step-up of activity in instruments, fabricated metals, motor vehicles, and engineering services brought increased demand for draftsmen. In areas such as Houston, where industry remained hard-hit by the recession, large surpluses of applicants persisted in this occupation, particularly of draftsmen with chemical and refining construction experience and for piping designers. The continuing effects of the recession in metalworking, abrasives, and chemicals in Buffalo also affected demand for draftsmen in that area.

Laboratory Technicians and Assistants

Applicants seeking employment as laboratory technicians in the 30 major labor market areas covered in this report declined from 3,475 in September to 2,900 in November 1958. Only five areas showed a significant increase in numbers of applicants in November. Many of the remainder showed a relatively large decline, partly as a result of the removal of the names of student applicants who had registered for summer employment.

The supply of available applicants exceeded demand in many areas, but where unfilled openings could not be met from the local supply, the skills needed were most frequently in the medical and health fields. Some areas have persistent shortages of such personnel. Boston, for example, has previously reported a shortage of medical technicians, and continued to characterize the supply as in "serious shortage" in November 1958.

New York also reported that "in the health and medical fields the shortages of. . .technicians is as great as ever. While salary raises tend to stabilize the work force, they do not succeed in increasing it." In St. Louis, the relatively low salary scale--frequently as low as $250 to $350 per month--was offered as the chief reason for a shortage of laboratory technicians. The shortage was most acute in hospitals and medical centers where a college degree and membership in the American Society for Clinical Pathology were requirements for job applicants. Low salary scales in Cleveland were also believed to be the primary reason for the curtailed supply of applicants for technician positions in hospitals since too few potential entrants are being attracted into training for the medical fields.

In Denver the consistent demand for medical technicians had reached such proportions that vacancies were being listed on the State inventory of job openings, and advertising in local papers had been arranged to list information on the occupation carried by medical publications. Technicians possessing the necessary qualifications for jobs in the medical field have been consistently in short supply in San Francisco, and in Portland a short supply of industrial X-ray technicians was reported by one testing laboratory. Otherwise in both areas, laboratory assistants and technicians appeared to be in good supply. In San Francisco the supply of such assistants had increased between September and November 1958, partly because of diminished activity in food processing.

Declines in the number of applicants were reported in the following areas: Providence, New Orleans, Dallas, Indianapolis, and Minneapolis, but in several of these areas the drop was partly a result of removal of student applications from the active file.

Information on the labor market conditions for other types of technicians including chemists' assistants and engineering assistants was provided in the report from Milwaukee where reference was made to current efforts to utilize technicians for many routine tasks:

> "There has been an increasing tendency for all firms to breakdown the engineer's job--using assistants or technicians to do many of the routine or less difficult tasks, leaving the higher paid engineer free to perform the more complicated tasks. There is a strong demand for technicians with one or two years of college engineering, science, or related training. In recruiting technicians, mathematical training is a prime requisite in most cases. Physics and chemistry also rank high in desirable training. Persons who have shown sufficient interest in industry by taking advanced evening school courses in mathematics, metallurgy, time and motion, and technology, etc. have been in demand. The Milwaukee School of Engineering and the Milwaukee Institute of Technology offer short courses and evening school courses that give technicians and engineers a good foundation for additional on-the-job training."

C. Analysis for Engineers by Area

Boston, Massachusetts

Openings received for engineers in the area increased from 76 in September to 119 in November, and indications are that the number needed is considerably higher. Electrical engineers are in serious shortage, while industrial and mechanical engineers are also in short supply. Despite continuing shortages, especially in the electronics field, methods of recruitment currently being used have attracted many engineers to the area from all over the United States, Canada, and England. Recruiters for one major electronics firm are presently being hired for travel to interview engineers in other parts of the country. Present estimates prepared by the Special Commission on Audit of State Needs indicates that the State will need to graduate twice as many engineers and closely allied scientific personnel per year in 1970 as were graduated in 1955.

New regulations for individuals practicing as engineers or land surveyors in Massachusetts became effective at the end of 1958, and may result in a shortage of qualified land surveyors when the season starts in the spring of 1959.

The number of available applicants declined in all categories except civil engineers which showed a slight increase between September and November. These applicants have experience in the supervision of construction projects and are not capable of filling openings for structural design engineers or other categories. (Openings placed in interarea clearance declined from 28 in September to 20 in November 1958.)

Providence, Rhode Island

The number of active applicants for engineering positions declined from 80 in September to 66 in November. At the same time the number of openings for engineers increased from 2 in September to 6 in November. Of the 66 applicants, nearly one-half were classified as mechanical engineers. The number of applicants in this category and in electrical engineering showed the greatest decline over the two-month period. (Only 2 openings were placed in interarea clearance in November.)

Buffalo, New York

Effects of the recession have eased but not eliminated the shortages for engineers and other professional personnel in the area, but recovery has lagged well behind that experienced by many other sections of the country and supply-demand relationships have not changed significantly since May.

An urgent shortage of electrical and aeronautical engineers persist, metallurgical and mechanical engineers are roughly in balance, and other engineering categories are in surplus supply. The demand for electrical and aeronautical engineers in the area is concentrated in a relatively small number of firms, one of which experienced sharp retrenchment in production activities during the period. While still hiring qualified aeronautical engineers the firm has reduced demand for mechanical engineers.

Active applications of engineers increased from 115 in September to 147 in November 1958, with the increased number of applicants largest in the specialty of mechanical engineering. Applicants in November, as previously, however, are frequently persons with job-acquired skills in production or production-related experience. Technically trained, qualified workers in these fields with the requisite specialized college degrees and recent employment experience can usually be placed in the present market. Openings received during November showed a large increase. A total of 51 were received in November compared with only 3 in September. (The number of openings placed in interarea clearance because they could not be filled locally declined from 129 in September to 110 in November 1958.)

New York, New York

Specialists including both scientific personnel and engineers with five or more years experience in electronics are still in great demand in New York City and the surrounding suburban area and are being actively recruited by firms from other parts of the country who hope to persuade topnotch engineers and scientists to leave the East. Many local firms have placed open orders--i.e. requests for an unlimited number of engineers--to work on electronic gear of all types. Openings for engineers reflect this increase with the total number of orders increasing from 15 in September to 28 in November, but the full extent of the need for electronic engineers is understated by this total.

In other fields, the employment market for civil, mechanical, and electrical engineers (other than electronic) is described as "spotty" with no really heavy layoffs impending, but only a few firms are hiring engineers and only on a highly selective basis. A similar situation in industrial architecture is reported for the area, with job openings for architects confined to top-flight personnel with experience in designing multi-story apartment houses, schools, hospitals, and commercial facilities. Consulting engineers engaged in highway work report activity in that field is at a standstill. Contracts are pending but only a minimum staff is needed at present.

(The number of active applicants showed a small increase during the two-month interval with a total of 1,207 in November; orders for engineers placed in interarea clearance dropped from 40 in September to 30 in November 1958.)

Paterson-Clifton-Passaic, New Jersey

Civil, electrical, and mechanical engineers, particularly those with specialized experience are not available among the dwindling number of applicants in the area. The total number of applicants declined from 235 in September to 206 in November, while the number of available openings listed during the month of November showed an increase over the September total. Among the applicants are former employees of major aircraft and electronics firms, many of whom do not have the qualifications to meet job openings currently listed, but who are not available for employment in other locations and remain in the area.

The demand for metallurgical, chemical, and industrial engineers was limited, but openings for aeronautical engineers with experience in design and flight development have been listed in interarea clearance for several months. (Openings placed in interarea clearance for engineers declined from 24 in September to 16 in November.)

Newark-Jersey City, New Jersey

Demand for chemical, civil, industrial, and mechanical engineers increased between September and November with unfilled job openings for these occupations higher in November. At the same time the number of available applicants in most of the engineering categories declined with the exception of civil and aeronautical engineers. A relatively long validity period (active applications are retained in the active file for 120 days) results in the conclusion that probably some of the registrants have already found employment through other means. (Openings placed in interarea clearance declined from 14 in September to 4 in November 1958.)

Philadelphia, Pennsylvania

The number of active engineering applicants dropped from 448 in September to 411 in November, and it appears that this group is composed of a hard core of older applicants with limited experience or education. The demand in the area is chiefly for qualified engineers under 40 years of age, with college degrees and specialized experience, and among this group pirating is quite common. In addition to various branches of electronics, a demand exists for metallurgical, mechanical, civil, and chemical engineers for the rocket and missile fields. Because of the recruitment methods now being used, it is difficult to measure the extent of this demand. (Openings placed in interarea clearance increased from 48 in September to 136 in November and represent chiefly orders of two major employers with specialized hiring requirements.)

Pittsburgh, Pennsylvania

The number of active applicants for engineering vacancies declined by about 100 between September and November 1958, when a total of 338 were registered in offices in the area. Very little activity other than the decrease in applicants was noted during the period, with relatively few openings received in November and only 5 placements, all of whom were industrial engineers. Employment in firms utilizing engineers either continued unchanged or fell off slightly and gave no indication of an anticipated upward trend. (Openings placed in interarea clearance because they could not be filled locally increased from 20 in September to 26 in November 1958, compared with about 100 in November 1957.)

Baltimore, Maryland

A total of 113 openings for engineers remained unfilled at the end of November--more than twice the number unfilled at the end of September. In the same period the number of active applicants for engineering positions remained nearly unchanged numbering 93 in November. Applicants in industrial engineering fell slightly while mechanical engineering applicants increased.)

(Unfilled openings placed in interarea clearance rose from 24 in September to 107 in November. Nearly all of the job openings placed in clearance were for electrical engineers. Current demand, especially in this category is much above the level of one year ago when job openings had declined and only 32 vacancies were placed in clearance.)

Washington, D. C.

In contrast to the situation in many areas, the number of applicants for engineering positions increased between September when a total of 99 were on file, to 129 in November 1958. The largest increase in applicants was among civil engineers. Openings unfilled at the end of November increased, chiefly for chemical and electrical engineers. The number of unfilled openings for civil engineers, however, declined in the same period. (Openings placed in interarea clearance because they could not be filled locally dropped from 355 in September to 340 in November, with the change largely a result of a decline in unfilled openings for electrical engineers. Openings for civil engineers continued to make up the major portion of the orders placed in interarea clearance.)

Louisville, Kentucky

The supply of engineers generally exceeded demand, and industries planning additions to their staff during the next four months do not use these specialized workers in any numbers. Of 30 engineering applicants, 24 were under 45 years of age. (Openings received during November numbered only 3, and no openings for engineers were placed in interarea clearance.)

Atlanta, Georgia

Demand for aeronautical engineers picked up in the latter part of September and revised listings placed both aeronautical and mechanical engineers in short supply for both September and November. Electrical engineers also continued to be characterized as in "shortage." Openings for aircraft engineers listed in September totaled 175, and by mid-November 133 such positions had been filled. Advertisements in local papers in mid-November listed more than 50 scientific and engineering positions available, of which only 4 were in the local area. The number of active applicants in all types of engineering declined from 92 in September to 66 in November. (Very few openings were placed in interarea clearance in either month.)

New Orleans, Louisiana

Active applicants for engineering positions remained at the same level between September and November with 58 applications on file in both months. Openings for engineers showed a small increase over the September level. Available applicants, however, did not have the specialization required. For example, an opening for a metallurgical engineer required an applicant with a degree in chemistry or metallurgy and 8 years experience in process development of ferrous ore; an opening for a chemical engineer required, in addition to a degree in chemistry, 5 years of experience in the production of sulphuric acid. Other openings remained unfilled because of similar specialized experience and educational requirements. (Openings placed in interarea clearance totaled 4 in November, compared to only 1 at the end of September, and 23 one year ago when the majority of the openings were for civil engineers for employment with the U. S. Corps of Engineers.)

Houston-Baytown, Texas

Supply continued to exceed demand for engineers in the area, with a total of 175 active applications in November compared with 194 in September. Only 12 openings for engineers were placed with the employment service during November. Employment possibilities in the area depend primarily on somewhat unpredictable labor market developments affecting the industries which employ the bulk of professional and engineering personnel. These industries, hardest hit by the recession, include oil production and refining, chemicals, primary metals, oil tool manufacture, and construction. More rigid hiring specifications include greater emphasis on experience, an increase in the length of specialized experience as well as more rigid age limitations. The maximum age with many major industrial firms is 35. (Openings placed in interarea clearance totaled 5 in November compared with 2 in September.)

Dallas, Texas

The supply of engineering applicants continued to decline between September and November with a total of 78 applicants available at the close of the latter month. At the same time openings for engineers continued to increase, reaching a total of 137 in November compared with 101 during September. These openings, it is believed, represent only the more urgently needed personnel. Contacts with local defense establishments in the area indicate that they would like to hire many more engineers than currently listed on personnel requisitions, if an adequate supply existed. Thus, the number of job openings actually understates the level of demand, and the available applicants frequently do not possess the qualifications to fill the specifications on the existing openings. The relative lack of job opportunities for trainees or inexperienced applicants in the area has not improved materially in spite of the continued shortages in most of these occupations. Demand is concentrated almost entirely in aircraft and electronics plants in the area, although there are examples of out-of-area recruitment and of significant increases in newspaper advertisements for electrical, mechanical, and aeronautical engineers. Some of these are placed by local defense plants, but many are placed by out-of-area employers.

During the period there has been some decline in the supply of industrial engineers listed with the local office, but with the exception of some slight increase in demand for civil engineers in municipal government public works departments, practically all current demand is for electrical and mechanical engineers. (No openings were placed in interarea clearance in either September or November.)

St. Louis, Missouri

Demand for engineers and other professional personnel is less acute than before the recession. Qualified engineers are always needed for the aircraft industry but the openings placed in interarea clearance because they could not be filled locally have been in the skilled occupations. Recruitment of engineers is limited by the following factors: an age limitation (preferably under 45 years); rigid experience specifications; slightly lower basic salaries compared with other areas; drafting experience; and educational qualifications, with particular emphasis upon college degrees. Employers do not offer training, and frequently could employ less qualified personnel for sales jobs, for example, rather than utilizing engineering personnel.

(During the period the number of active applications dropped--in September the total was slightly over 100--in November 1958 it was 47; the number of openings placed in interarea clearance for engineers remained very small.)

Kansas City, Missouri-Kansas

While the aggregate supply of engineers currently exceeds aggregate demand, there are instances of shortage for those with specialized training and experience. (The number of active applications for engineers declined from 42 in September to 33 in November 1958; openings placed in interarea clearance increased from 1 in September to 16 unfilled openings for electrical engineers in November 1958.)

Indianapolis, Indiana

Engineering applicants remained relatively unchanged with a total of 43 on file in November 1958. Few openings were received for engineers during November, but the total number of unfilled openings at the end of that month was higher than at the end of September. Several openings for engineers were for firms outside the area. Local openings included a physical metallurgist and industrial engineers for a primary metals producer; and a chemical engineer for a rubber products manufacturer, and mechanical engineers for the automotive industry, in addition to currently placed openings for civil engineers. All available openings had specific experience requirements which were an important factor in locating qualified applicants. (Very few openings were listed in interarea clearance during either period.)

Cincinnati, Ohio

Supply exceeded demand for engineers in all categories at the end of November. A slightly larger number of applicants for engineering positions were on file with the employment service at the end of November than in September, when the total stood at 30 applicants. The number of unfilled openings at the end of both months was over 200, but relatively few of these vacancies were placed during November. Industries planning employment additions during November did not use specialized workers, including engineers, in any number. (Openings placed in interarea clearance totaled 10 in November 1958 compared with 6 in September.)

Columbus, Ohio

Engineering applicants declined sharply from a total of about 60 in September to 25 in November 1958. At the same time there was a small increase in the number of unfilled openings--18 were reported on hand at the end of September and 26 at the end of November. (Openings placed in interarea clearance during both periods remained nearly unchanged at a total of 13 in November 1958.)

Cleveland, Ohio

A sharp drop in the number of engineering applicants, from 345 on file in September to 274 in November, may be partly attributed to a change in the validity period. It was reduced from 60 to 30 days. In general, hiring specifications have become stricter during the past year, with employers demanding more specialized experience and longer periods of experience in the particular engineering field and usually preferring some post-graduate training. Age limitations are also less flexible than they were, and it is felt that the wages offered are low in view of the more severe requirements.

Openings received in November increased slightly over the September total, and while employment picked up somewhat between September and November, the increase mainly resulted from recalls. Openings received during November remained low. The number of unfilled openings, however, showed a small increase in November, with a total of 22 compared with 13 at the end of September. (Orders placed in interarea clearance because they could not be filled locally remained near the September figure, and numbered 8 in November 1958.)

Detroit, Michigan

Call-backs in the automobile and related industries account for the decline in active applications of engineers, with decreases occurring in all categories except electrial and industrial engineers. In all classifications 804 engineers were registered in September and 779 applicants in November 1958. During the same period the number of openings for engineers showed an increase. Openings received for engineers totaled only 12 in September, but increased to 30 in November. The number of unfilled openings placed in interarea clearance because they could not be filled locally, however, showed a reverse trend, chiefly because of the cancellation of orders for professional personnel because of a revision in employment requirements by one major employer with defense contracts. Recent information indicates, however, that new contract awards to the same employer may create a demand for engineers in the near future. (Unfilled openings placed in interarea clearance declined from 124 in September to 7 in November 1958.)

Chicago-Calumet, Illinois-Indiana

Job openings for engineers received during November totaled 77 and were three times as great as during September 1958. Although openings increased, the number placed in interarea clearance because they could not be filled locally was not much higher in November. The improved economy affected the number of registered applicants which dropped below the number reported in September. At that time 437 applicants were on file for engineering employment, compared to a total of 368 in November. In the specific fields of engineering reported separately, it was noted that metallurgical engineers are offered tuition refunds for graduate study in metallurgy by one firm in the area. Employment of such engineers is expected to increase when a new rolling mill is completed by a steel producer in the area. Civil engineers were employed by one construction firm building a new plant in the area. Some of the applicants in this category are handicapped by a language barrier, and lack of citizenship, as well as education in a foreign country which hampers placements. Lack of citizenship also hampered efforts to place available electrical engineering applicants. A leading electronics manufacturer placed most of the orders for this occupation with the local employment service but age discrimination as well as educational qualifications prevented placement of some applicants. Registered industrial engineers in some cases hold degrees in other fields. (Openings placed in interarea clearance increased slightly--from a total of 26 in September to 29 in November 1958.)

Milwaukee-Waukesha, Wisconsin

The demand-supply relationship for engineers in general reflects the tightening of the overall labor supply situation during the period between September and November. Active applications of all groups except chemical engineers decreased during the period, while new openings for the same categories of engineers rose moderately. Unfilled openings at the end of November showed a similar increase with a total of 157 openings compared with 143 at the end of September. Hiring of professional workers by one major producer in the area was resumed following the settlement of a labor dispute. The firm is one of the major employers of engineering and scientific personnel on complicated inertial guidance systems. Other large employers are recalling some of the professional personnel laid-off during the recession. New openings placed with the employment service come primarily, however, from smaller employers who do not have a pool of engineers and technicians to draw from, or workers on layoff status. Especially among smaller employers, there is now a brisk demand for engineers with a combination of specialization, such as electrical-mechanical engineers. Cost-conscious employers hope to cut design and development expenses by having one rather than two engineers carry out a project. In general, a moderate increase in professional staffs is expected in coming months with little change in the level for governmental and educational establishments in the area. (Openings placed in interarea clearance dropped from a total of 41 in September to 31 in November 1958.)

Minneapolis-St. Paul, Minnesota

Active applicants for engineering employment continued a downward trend decreasing from 144 applicants in September to 96 in November 1958. About one-half of the decline occurred among mechanical engineers, the only group for which there has been a significant increase in openings during the same period. Openings received for all engineers in the area more than doubled; the total received in September was 17 and in November was 36. Openings placed in interarea clearance, however, did not show any major change. While the numbers involved are relatively small, the trend is quite different than one year ago. At that time applications more than doubled; job openings were cancelled because of the recession and contracts were stretched out. (Openings placed in interarea clearance totaled 38 in September and 32 in November 1958.)

Denver, Colorado

Job openings showed a decline during the period with 136 openings reported during September and only 65 in November 1958. The drop is attributed to curtailment in activities utilizing engineers locally rather than to an increase in the supply in the area or to meeting all manpower needs. A temporary halt in the extensive programs in the metropolitan area during the past six months accounts for the approximate balance in supply and demand for engineers. Personnel graduating from local universities in engineering appear to be sufficient to meet the anticipated demands in most of the engineering occupations. Future resumption of certain State and Federal programs, defense contracts held by private employers and out-of-State recruitment may create demands in excess of the present potential supply beyond the next six months. The present supply of engineers is regarded as surplus in the following categories: chemical, civil, industrial, and mechanical. The number of active applications in the area declined, however, from 125 in September to 87 in November 1958. Shortages of both electronic and aeronautical engineers continue. (Openings placed in interarea clearance declined from 127 in September to 50 in November 1958.)

Los Angeles-Long Beach, California

Reduction in the demand for engineers, particularly electrical engineers, was the most significant factor in the sharp drop in openings between September and November 1958. Despite the drop in new openings, from 673 in September to 319 in November, a strong total demand persisted with unfilled openings showing a moderate increase in November. The number of openings placed in interarea clearance because they could not be filled locally also moved upward. Mechanical, including aeronautical engineers, represented the most critical shortage. Inability to match engineering applicants with the appropriate engineering openings continued to reflect the problem of highly selective recruitment for specialized jobs in research and development. The number of active applicants in engineering occupations dropped from 1,095 in September to 871 in November but many of the available applicants lacked experience in the particular specialties or otherwise presented only partial qualifications. The concurrent downtrend in openings and applications at a time when shortages became more stringent seems to suggest some relaxation in hiring specifications was occurring. (Openings for engineers placed in inter-area clearance increased from 456 in September to 504 in November 1958.)

San Francisco-Oakland, California

Engineering applications continued downward, a trend which has been evident since May--512 were registered in that month; 328 in September, and 314 in November. Metallurgical engineers and metallurgists are available in the area though well-qualified engineers with specific types of experience in this field were in critical shortage in some areas. Active applicants for aeronautical engineering positions declined, with no apparent demand locally to account for the decrease. The number of mining engineers in the area has remained very small, considering the fact that no engineering specialty has been harder hit in the entire western part of the United States.

Demand for chemical engineers has turned upward because of increased activity in food technology and nuclear research, but the number of chemical engineers has declined, chiefly because of the unfavorable employment picture in the summer for the chemical and petroleum industries. Industrial engineers, one of the first groups to be eliminated in the recession because many held staff positions in management, are now being reabsorbed as production is increasing.

Well-qualified men in electronics have not been available in any quantity since May, and none are believed to be presently unemployed except an occasional individual who has held a highly paid supervisory position. For this group of older men who have held supervisory positions, it is difficult to obtain nearly comparable jobs because of the emphasis on a team approach in much of this engineering activity, and the reluctance of youthful supervisors to take on older subordinates. Electrical engineers in other types of employment who know local community codes and light industry codes have had little difficulty finding employment, although there has been difficulty in reabsorbing the "heavy" power men let out at the beginning of the recession.

San Francisco-Oakland, California

The supply of civil engineers continued to drop but remained the second largest surplus group. A good and prolonged construction season, combined with a larger backlog of unfilled job openings at the beginning of the recession for civil engineers for government establishments in the area, was chiefly responsible for the continued decline of registrants in this field. The slowdown affecting refineries and chemical plants, where process men and piping specialists were released, as well as cutbacks in production by manufacturers of machinery have contributed to a surplus of mechanical engineers.

The diminishing supply of engineers does not mean that all of the men released during the recession layoffs have been absorbed into local engineering work because some have left the area, while others have accepted non-engineering jobs in order to remain in this area and are awaiting a revival in their former activities. In the meantime, the imbalance continues with job openings largely in the "esoteric specialties" such as nuclear engineering while the supply is characterized by "bread and butter" engineers--for example, those specializing in heavy power equipment. Civil engineers from heavy construction are seeking employment, while job openings are more frequently from establishments looking for men qualified to work in nuclear engineering or computer technology and such jobs are often filled from in-migrants or recent graduates. Age restrictions do not constitute the bar to placements that is posed by demands for specialized experience, graduation from a recognized school, or citizenship. (Only 5 unfilled openings were placed in interarea clearance in November 1958.)

Portland, Oregon

The current supply of engineers is nearly adequate, with shortages limited to specific highly specialized fields. A seasonal slack occurred in civil engineering--openings declined, and the number of active applicants showed an increase. Twelve applicants for electrical engineering vacancies were registered but none possessed the particular requirements demanded by a company seeking a qualified electrical engineer in the field of aircraft electronics. It was reported that engineers with industrial experience do not qualify as electrical research engineers, and most of the available applicants have been released from industry as a result of cutbacks. A few industrial engineering applications are on file, but special job orders are difficult to fill because applicants lack some particular qualification, as for example a currently unfilled opening for an appraisal engineer with civil service status. The number of mechanical engineering vacancies was very small and available applicants were reluctant to take jobs involving sales work. Despite an apparent surplus in the occupation, and an increase in applicants over the period, it was difficult to fill specific openings. (Very few unfilled openings were placed in interarea clearance for engineers.)

Seattle, Washington

Demand for engineers continues to be primarily for the aircraft industry which needs qualified personnel for its missile research and planning operations, outer space program, and new jet aircraft developments as well as to provide needed technical advice and experience to carry out the present backlog of plane commitments. The quantitative demand far exceeds the local area's supply of engineers and other specialized personnel. Compared with only 52 active applicants in the area in November, there were 906 unfilled openings at the end of November with the majority of these openings for electrical, industrial, and mechanical engineers for the aircraft industry. Significant changes in employment are not anticipated in the next few months. (A total of 885 unfilled openings were placed in interarea clearance in November, the same total were placed in interarea clearance in September.)

III. Appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Bureau of Employment Security, Office of Program Review and Analysis. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is an Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

A summary of information on clearance openings in all States has been utilized in the preparation of the bimonthly reports entitled *Local Shortages in Selected Scientific and Engineering Occupations* prepared at the request of the National Science Foundation.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas 1/ for the first time in May 1958. These area labor market reports provide bimonthly information on local economic factors contributing to changing demand-supply relationships for engineering, scientific and technical personnel in the area. Insofar as possible other sources of information are utilized including occupational information from labor market areas.

1/ The occupations covered and the appropriate code number from the *Dictionary of Occupational Titles* include: Engineers, metallurgical and metallurgists (0-14), Engineers, chemical (0-15), Engineers, civil (0-16), Engineers, industrial (0-18), Engineers, mechanical (0-19), Engineers, aeronautical (0-19.03), Engineers, mining (0-20), Chemists (0-07), Natural Scientists, n.e.c. (0-35), Draftsmen (0-48), and Laboratory Technicians and Assistants (0-50). A list of the 30 areas appears on page 26.

List of 30 Major Labor Market Areas

Boston, Massachusetts
Providence, Rhode Island
Buffalo, New York
New York, New York
Paterson-Clifton-Passaic, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Baltimore, Maryland
Washington, D. C.
Louisville, Kentucky
Atlanta, Georgia
New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas
St. Louis, Missouri
Kansas City, Missouri-Kansas
Indianapolis, Indiana
Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Detroit, Michigan
Chicago-Calumet, Illinois-Indiana
Milwaukee-Waukesha, Wisconsin
Minneapolis-St. Paul, Minnesota
Denver, Colorado
Los Angeles-Long Beach, California
San Francisco-Oakland, California
Portland, Oregon
Seattle, Washington

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-March 1959

Month and Year	All Occupations	Professional and Managerial	Selected Occupations			
			Total	Engineers	Scientists	Draftsmen & Technicians
Jan. 1956	27,887	12,845	6,844	4,792	476	1,576
Jan. 1957	35,629	14,498	9,327	6,349	723	2,255
March	34,390	15,952	9,330	6,428	762	2,140
May	31,452	14,007	8,434	5,976	606	1,852
July	29,144	11,879	7,467	5,437	650	1,380
Sept.	23,208	8,986	5,506	3,946	595	965
Nov.	13,859	5,388	2,908	1,993	323	592
Jan. 1958	14,665	7,726	2,634	1,817	297	520
March	14,451	8,244	3,563	2,717	465	381
May	15,552	9,439	3,572	2,764	397	411
July	14,420	7,514	3,584	2,921	277	386
Sept. R/	15,363	8,732	5,498	4,447	626	425
Nov. R/	17,661	9,308	4,924	3,906	610	408
Jan. 1959	16,042	10,530	5,423	4,312	579	532
March	17,960	10,820	5,654	4,292	740	622

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

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Table II. Clearance Openings in Selected Occupations
November 1958, September 1958, and November 1957

Occupation	Nov. 1958	Sept. 1958	Nov. 1957	Percent change to Nov. 1958 from: Sept. 1958	Percent change to Nov. 1958 from: Nov. 1957	Percentage Distribution November 1958
All selected occupations	4,924	5,498	2,908	-10.4	+69.3	100.0
Professional						
Engineers, total	3,906	4,447	1,993	-12.2	+96.0	79.3
Metallurgical	27	22	56	a/	-51.8	0.5
Chemical	58	54	196	+7.4	-70.4	1.2
Civil	792	799	285	-0.9	+177.9	16.1
Electrical	1,570	1,750	605	-10.3	+159.5	31.9
Industrial	172	156	117	+10.3	+47.0	3.5
Mechanical (except aero.)	909	1,033	558	-12.0	+62.9	18.5
Aeronautical	377	633	167	-40.4	+125.7	7.7
Mining	1	0	9	a/	-88.9	---
Other professional	610	626	323	-2.6	+119.8	12.4
Physicists	194	156	80	+24.4	+142.5	3.9
Mathematicians	137	163	52	-16.0	+163.5	2.8
Chemists	91	79	111	+15.2	-18.0	1.8
Life scientists	38	24	35	+58.3	+8.6	0.8
Writers, tech. pubs.	135	195	29	-30.8	+365.5	2.7
Physical scientists	10	5	7	a/	a/	0.2
Statisticians	5	4	9	a/	a/	0.1
Semiprofessional						
Draftsmen, total	243	255	384	-4.7	-36.7	4.9
Mechanical	75	62	126	+21.0	-40.5	1.5
Other	168	193	258	-13.0	-34.9	3.4
Laboratory technicians and assistants, total	165	170	208	-2.9	-20.7	3.4
Medical technicians	133	118	117	+11.3	+11.4	2.6

a/ Percent change not shown where both absolutes are less than 50.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations November 1958 and September 1958

Labor Market Area	Engineers		Chemists		Natural Scientists		Draftsmen		Laboratory Technicians	
	Nov.	Sept.	Nov.	Sept.	Nov.	Sept.	Nov.	Sept.	Nov.	Sept.
Total.	6,848	7,801	922	1,135	715	941	6,877	8,303	2,900	3,475
Boston	216	289	49	55	42	51	202	193	123	142
Providence	66	80	13	15	5	5	38	49	32	52
Buffalo.	147	115	21	20	8	8	96	90	86	60
New York	1,207	1,157	291	311	163	233	1,286	1,136	354	610
Paterson-Clifton-Passaic	206	235	23	37	5	15	116	199	72	97
Newark-Jersey City . . .	392	558	75	111	49	66	339	410	226	289
Philadelphia	411	448	44	52	21	26	371	569	215	233
Pittsburgh	338	421	38	36	24	28	577	677	376	384
Baltimore.	93	94	14	14	8	4	100	101	40	52
Washington, D. C. . . .	129	99	28	31	53	45	83	73	69	57
Louisville	30	44	6	11	3	4	11	26	25	20
Atlanta.	66	92	6	8	4	6	24	45	38	41
New Orleans.	58	58	12	12	10	27	35	55	16	28
Houston-Baytown.	175	194	24	24	48	64	168	292	64	80
Dallas	78	90	6	9	32	28	61	84	20	38
St. Louis.	47	103	5	9	4	7	58	105	31	54
Kansas City.	33	42	5	7	3	9	26	41	14	22
Indianapolis	43	44	0	5	2	4	26	64	25	30
Cincinnati	34	30	0	7	2	0	39	41	35	39
Columbus	25	59	6	13	5	10	26	67	14	43
Cleveland.	274	345	12	38	9	13	357	575	95	154
Detroit.	779	804	21	30	8	8	998	1,184	156	163
Chicago-Calumet.	368	437	60	72	11	48	425	474	147	138
Milwaukee-Waukesha . . .	154	189	22	26	24	27	93	119	41	49
Minneapolis-St. Paul . .	96	144	12	16	13	27	128	105	49	69
Denver	87	125	8	11	21	24	33	61	29	30
Los Angeles-Long Beach .	871	1,095	71	91	73	88	813	1,010	239	249
San Francisco-Oakland. .	314	328	38	57	45	46	243	381	202	197
Portland	59	56	7	6	11	18	57	51	41	39
Seattle.	52	26	5	1	9	2	48	26	26	16

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CURRENT LABOR MARKET CONDITIONS
for
Engineering, Scientific, and Technical Personnel

March 1959

UNITED STATES DEPARTMENT OF LABOR
James P. Mitchell, Secretary
BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

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This is the fifth in a new series of bimonthly reports prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It consists mainly of summaries of field reports on current conditions in 30 major labor market areas and statistics on job openings for selected engineering, scientific and technical occupations placed in interarea clearance by public employment offices throughout the country.

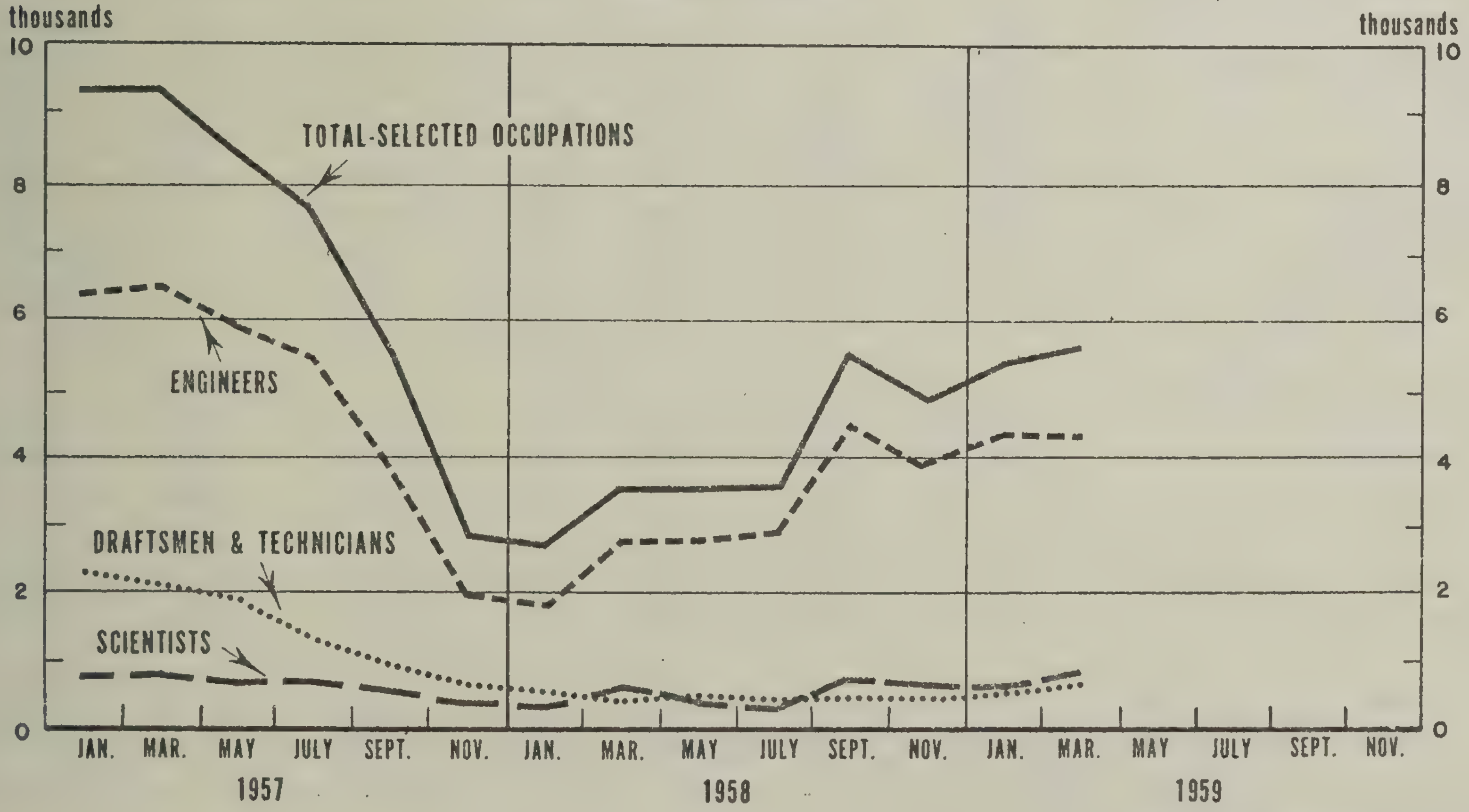
CURRENT LABOR MARKET CONDITIONS FOR ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

I. Highlights of Interarea Recruitment Activity - March 1959

Unfilled job openings in selected engineering, scientific, and technical occupations placed in interarea clearance numbered 5,650 in March, about 100 more than in January. A bimonthly increase occurred in listings for scientific and technical personnel, which offset a decline in vacancies for engineers. The March total exceeded the 1958 high reached in September, and was 2,100 more than in March 1958, but was substantially less than the 9,330 reported in March 1957.

Vacancies for engineers, which accounted for three-fourths of the openings listed for all selected classifications, declined from 4,390 in January to 4,290 in March. The drop was largely in listings for civil engineers and was due almost entirely to the termination of recruitment for the road building program by the USES for the District of Columbia.

TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957-1959



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

In contrast to this decline, workers in several other engineering classifications, particularly electrical engineers, were in greater demand through the public employment offices in March. Electrical engineers, for a long time the largest classification of engineers in short supply, continued to head this select group. Shortages in this occupation, as expressed by inventories of job openings in clearance, rose from 1,746 in January to 1,921 in March. The importance of this group is further evidenced by their proportion of all engineering vacancies. They comprised 45 percent of the engineering vacancies in March, compared to 40 percent in January and 34 percent in March 1958.

Number of Nonagricultural Job Openings in Selected Occupations
in Interarea Clearance at Public Employment Offices,
March 1959, January 1959, and March 1958

Selected Occupation	Job Openings			Change to March 1959 from: Jan. 1959		March 1958	
	Mar. P/ 1959	Jan. R/ 1959 3/	Mar. 1958	Number	Percent	Number	Percent
All selected occupations	5,654	5,545	3,564	+109	+2.0	+2,090	+58.6
Engineers, total	4,292	4,386	2,717	-94	-2.1	+1,575	+58.0
Chemical	100	87	122	+13	+14.9	-22	-18.0
Civil	392	676	836	-284	-42.0	-444	-53.1
Electrical	1,921	1,746	924	+175	+10.0	+997	+107.8
Industrial	204	179	162	+25	+14.0	+42	+25.9
Mechanical 1/	925	937	445	-15	-1.3	+480	+107.9
Aeronautical	706	722	179	-16	-2.2	+527	+294.4
Selected scientific occupations	740	608	466	+132	+21.7	+274	+58.8
Physicist	177	177	105	n.c.	n.c.	+72	+68.6
Mathematician	166	161	80	+5	+3.1	+86	+107.5
Chemist	108	89	156	+19	+21.3	-48	-30.8
Technical writer	181	119	67	+62	+52.1	+114	+170.1
Other 2/	108	62	58	+46	+74.2	+50	+86.2
Draftsman	392	377	204	+15	+4.0	+188	+92.2
Laboratory technician	230	174	177	+56	+32.2	+53	+29.9

1/ Mechanical, except aeronautical
2/ Includes other natural scientists, n.e.c.
3/ January 28-February 10, 1959

P/ Preliminary
R/ Revised
n.c.--no change

The number of engineering vacancies placed in interarea clearance by public employment offices was 58 percent higher in March 1959 than a year earlier. Over the year, the demand doubled for electrical and mechanical engineers and almost quadrupled for aeronautical engineers but was sharply curtailed for civil engineers.

Job openings for selected scientific occupations rose by 130 from January to bring the March total (740) well above that of a year earlier (465), and only slightly below the peak of 762 for these classifications reported in March 1957. Chemists, technical writers, and life scientists showed significant increases between January and March in the number of clearance openings.

Unfilled job openings for draftsmen and laboratory technicians were placed in interarea clearance by most States in March. For example, public employment offices in at least 35 States were recruiting 390 draftsmen and 230 laboratory technicians. These supporting personnel groups also participated in the over-the-year increases in demand reflected in the changes in unfilled listings for engineers and scientists.

II. Trends in Labor Demand-Supply Situation by Occupation and Major Area - January 1959

A. Summary

The job market for engineers, scientists, and technical personnel improved between November 1958 and January 1959. In the 30 labor market areas which report in detail on these classifications, unfilled job openings rose by 13 percent during this period. Further evidence of improved opportunities is furnished by the number of openings in these occupations placed in the nationwide system of interarea clearance by public employment offices. Clearance vacancies in all areas in the U. S. increased during this period, largely offsetting a drop in the previous bimonthly period. In January, they numbered 5,500--slightly more than in the 1958 peak in September. Although listings in January 1959 were double the number a year earlier, they were substantially below the 9,300 reported in January 1957.

January demand for workers in these classifications was geographically concentrated. Three areas--Los Angeles, Seattle, and Washington, D. C.--accounted for two-thirds of the clearance openings (3,072) in all 30 areas combined. In 8 of the 30 areas there were substantial increases in clearance openings in January. Partly resulting from these expanding needs, the number of active applications in these 30 areas declined by 700, or 4 percent, from November to January.

Many of the shortages reported in the 30 areas were in new industries associated with defense activities--space exploration and missile fields--and for research laboratories. Unfilled openings for engineers in the 30 labor market areas were up from 3,600 in November to 3,900 in January. Most of the additional unfilled openings were for electrical and mechanical engineers, mainly for work in Boston and Los Angeles. These two areas had increases from November to January of at least 100 unfilled openings. Demand for other selected professional occupations remained unchanged from November to January (Table II). Most of the needs were for physicists, mathematicians, and technical writers. Seattle reported 227 unfilled openings for natural scientists, more than half of all unfilled openings for these scientists in the 30 labor market reporting areas.

Clearance openings for draftsmen turned up sharply in January. Despite this upturn, the number of registrants at public employment offices in nearly all 30 areas exceeded the demand.

The demand-supply situation for laboratory technicians and assistants remained relatively stable from November to January. Shortages of medical technicians were still particularly marked.

B. Analysis by Major Occupation

Engineers

The supply of engineers, as indicated by the number of active registrations at public employment offices, was affected by conflicting tendencies in the 30 reporting labor market areas during the period from November 1958 to January 1959. In some areas, the number of applicants was augmented by layoffs resulting from curtailment of aircraft production and by the entry of recent graduates into the labor market. At the same time, several factors were operating which more than offset these gains. An upturn in durable goods manufacturing, increased orders for production of radar and other high frequency communications equipment, expansion in various research and development projects, government awards for missiles programs--all these served to stimulate demand and reduce the available supply of applicants. The net result was a reduction of almost 450, or 7 percent, from November 1958 to January 1959 in the number of engineering applicants.

The pick-up in demand for engineers from November to January is also reflected on the national level in the number of job openings in clearance. For the first nine months of 1958, clearance listings for engineers rose from 1,800 to 4,450 in September. A setback took place from September to November, but in January, the September 1958 peak had almost been regained (Table I). The January 1959 listings of 4,400 vacancies indicate a substantial recovery from a year earlier but were well below the 6,350 openings reported for January 1957. All engineering classifications, except civil, showed bimonthly gains but were numerically largest for aeronautical and electrical engineers (Table II). Research and development work in missiles and in the field of communications appear to be major factors in stimulating the demand for electrical and aeronautical engineers. The rising demand for electrical and aeronautical engineers resulted in these two classifications accounting for an increasing proportion of all engineering vacancies. Opportunities for electrical engineers alone accounted for two-fifths of all engineering vacancies in January 1959 while aeronautical listings comprised 17 percent of the total. A year earlier, electrical listings were one-third of the total engineering vacancies and aeronautical, 7 percent.

The number of unfilled openings placed in interarea clearance by the 30 major labor market areas providing special information on the selected occupational groups does not indicate as sharp an increase in demand as the data on clearance openings for the Nation as a whole. As indicated in the information furnished separately for engineers 1/, many areas indicated that demand for engineers had remained relatively stable from November to January. Ten areas reported sizable increases in demand 2/ but six had losses. One of the areas

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1/ See Analysis for Engineers by Area beginning on page 9.

2/ Demand was considered to be relatively stable unless a difference of at least five openings was reported between November and January.

with a decline in listings noted that a large order for engineers had been received too late to place into clearance. The largest gain in clearance openings was in the Seattle area which reported 96 more listings in January than in November. Most clearance orders in this area were for its aircraft industry.

Natural Scientists and Selected Professional Personnel

The supply of natural scientists, as indicated by applicants at local public employment offices, declined by 12 percent in 30 major labor market areas providing detailed information on these selected occupations. Two areas--New York and Los Angeles--reported 136 and 108 job seekers, respectively, in these professions. No other area had as many as 50 registrants.

The supply of natural scientists differed considerably among the reporting areas. Denver noted that its supply remained the same from November to January, but added that graduates from local colleges and universities in the field of natural science have proved an adequate source of supply. The imbalance between supply and demand was most marked in Seattle. There, the local office reported only three applicants with college degrees compared with 227 unfilled openings. In the San Francisco area applicants in natural science exceeded the number of unfilled openings. But this is no indication, according to the local labor analyst, that there is any surplus of the highly trained and specialized physicists, mathematicians, and life scientists needed in the area's research centers.

Information on the demand for these professional workers is evidenced by the statistics on clearance openings. For the country as a whole, there was virtually no change in the total demand between November and January. However, marked changes occurred in specific occupations. Fewer listings were reported in January than in November for physicists, life scientists and technical writers but added opportunities for mathematicians and physical scientists.

In contrast to the nationwide situation, clearance openings for natural scientists increased in the 30 labor market areas between November and January. The rise was due primarily to added listings in Seattle and New York. In Seattle, the unfilled openings noted above were placed in the Professional Office Network of the public Employment Service for nationwide clearance offices. New York indicated that demand was strong for physicists with experience in the "solid state" field.

Total unfilled openings at the end of the month (whether in demand or not) provide another indicator of the demand for natural scientists. The number of these openings rose by 9 percent from November to January. The largest numerical increase was in Los Angeles, with 227 unfilled openings--all of which were placed in interarea clearance. In the Minneapolis-St. Paul area, an increase in unfilled openings was simply attributed to gains in business expectations.

Chemists

The number of chemists registered for employment in 30 major labor market areas totaled 1,230 in July 1958, 920 in November 1958, and 860 in January 1959. In each period, New York accounted for about 30 percent of the job applicants.

The demand for these workers, as indicated by job openings in clearance, has not been very large. Nearly 90 vacancies were reported throughout the nation in January, the same number as in November.

Clearance openings for chemists in the 30 labor market areas indicated no visible demand to account for the drop in registrants. In fact, clearance listings in these areas declined from November to January. Future prospects, too, were not very encouraging. In Kansas City, no appreciable increase in demand was foreseen for the near future. Denver also reported limited job opportunities with no change in the situation expected because of the lack of industry utilizing this type of personnel.

Draftsmen

Clearance openings for draftsmen turned up sharply between November and January. Of 380 openings in nationwide clearance in January nearly one-third were for mechanical draftsmen.

In the 30 labor market areas for which information is gathered on engineering, scientific, and technical personnel, clearance listings increased three fold between November and January. A large part of the increase was due to a large order for marine draftsmen in the Boston area.

Although demand for draftsmen picked up in the bimonthly period ending in January 1959, the supply of applicants far exceeded the demand. Almost 6,750 job applications were on file in January in the local offices of the public employment service in the 30 labor market areas. The area supply situation varied considerably. In the Philadelphia area, the number of draftsmen registered at local offices increased from 370 in November to 510 in January. Most of this increase in draftsmen came from large construction firms, consulting engineers, marine engineers, and architects and machinery manufacturers, which had layoffs. In sharp contrast, in the Newark-Jersey City area, the supply at local offices dropped due to a sharp increase in orders from employers engaged in research and development, and production of radar, electronic, and other high frequency communications equipment.

The number of unfilled openings in Boston nearly tripled from November to January. In the Paterson-Clifton-Passaic area the dwindling supply of draftsmen was attributed to expansion in engineering and research services. In Cincinnati and Denver, the overall supply of draftsmen was in excess of demands. However, this did not extend to some specialized fields such as electronics, aeronautics, atomic and computer applications.

Laboratory Technicians and Assistants

Of the engineering, scientific, and technical personnel for which data are gathered, laboratory technicians and assistants comprised the only major component in which there was no decrease from November to January in the number of registrants in the 30 labor market areas. A possible explanation is that this field includes many essentially entrant workers whose training and work experience fall below the standards and, in some cases, the need for licensed personnel, of interested employers. Some areas noted that applicants and jobs do not readily mesh. Active applications in January totaled 2,905, only slightly more than in November. Within the 30 labor market areas, however, the supply situation varied considerably. In the Newark-Jersey City area, the available supply dropped by half without a commensurate change in new orders. But in Los Angeles, the supply increased substantially due largely to new entrants in the labor markets.

Unfilled orders placed in interarea clearance were up slightly in the nation from November to January. Almost 175 vacancies were listed in January, up 6 percent from November but 15 percent less than in January 1958 (Table II).

The largest unmet needs in this category continue to be for hospitals and medical centers. Serious shortages of medical technicians were reported in the Boston, New Orleans, St. Louis, and Denver areas. The local office counts of openings understate the unmet demand since many prospective employers do not place orders with the employment service on the generally valid assumption that qualified applicants are not available from any source. In the St. Louis area, the demand was for technicians with a degree, some practical experience, and membership in the American Society for Clinical Pathology. But starting salaries are generally not high enough to attract any qualified applicants that might turn up.

C. Analysis for Engineers by Area

Boston, Massachusetts

The demand-supply situation in January 1959 was more out-of-balance than two months ago and shortages have increased over the year. Registrations from engineers at local employment offices dipped between November 1958 and January 1959 while more openings were received in January than in November. More openings were in interarea clearance in January 1959 than a year earlier.

The most troublesome problem in the Boston labor market area was the imbalance between supply and demand for electronics engineers. The tally of registrations in this classification was the same in January as in November but demand was up sharply due to needs of a major employer holding defense contracts for electronic devices of all kinds in the space exploration and defensive missile systems fields. Unfilled openings at the end of January for these engineers numbered 198 compared with only 47 in November.

Providence, Rhode Island

Of the 61 engineering applicants registered at local public employment offices, only 23 held a college degree. Mechanical engineers, who constituted the largest group of applicants, together with industrial engineers accounted for two-thirds of the engineering applicants. Relatively few vacancies were received during the period; however, architectural engineers continued to be unavailable among registered applicants. Only 2 openings were placed in interarea clearance in January, the same as in November.

Buffalo, New York

A shortage of electrical and aeronautical engineers but a surplus of chemical, civil, and industrial engineers characterized this area in January. For other engineering classifications, the supply-demand situation was in balance. The number of openings on hand was down to 147 at the end of January from 153 at the beginning of December. The number of available applicants also declined during the period from 153 to 147 in January. Unfilled openings placed in interarea clearance continued unchanged at 110 from November to January.

New York, New York

The demand for research personnel qualified to work on various phases of electronic development and electro-mechanical instrumentation showed no signs of abatement. Unfilled openings reflected this demand as the total number increased from 34 at the end of November to 45 at the end of January, but the full extent of the need for electronic engineers would be understated by this total. The difficulty in finding qualified personnel is exemplified by the story of a firm in the metropolitan area which is offering a bounty of $250 to any employee who recommended a qualified engineer who was subsequently hired by the company.

Top architectural designers with experience on commercial, institutional and multi-story apartment houses were in fair demand during the past several months. Persons with only industrial experience represented one of the most difficult types to place.

The largest applicant group of engineers, mechanical engineers, found no local demand for their skills but they were not willing to relocate. In other fields, chemical and electrical (other than electronics) engineers with excellent background and years of experience in power plant, oil refinery, and industrial processing plant design were in plentiful supply in the local labor market in January. There is no sign that this group will be absorbed in the near future by local employers although many consulting engineering firms in the city are confident that a pickup will take place shortly in industrial construction.

The number of active applicants showed an increase of only 9 from November to 1,216 in January; orders for engineers placed in interarea clearance also increased during the two months interval from 30 to 41 in January.

Paterson-Clifton-Passaic, New Jersey

The number of active applications on file dropped from 206 in November to 146 in January. This was due to recent requirements for electrical, industrial and mechanical engineers by companies engaged in missile work for the government. The current demand for these classifications is expected to continue during the coming months.

There was no noticeable demand for metallurgical, chemical and civil engineers. Openings for aeronautical engineers, which had been listed in interarea clearance for months, were withdrawn in January. However, this decline was offset by additional listings of clearance openings for electrical engineers. As a result of these influences, the number of clearance openings was up 2 from November to 18 in January 1959.

Newark-Jersey City, New Jersey

Orders for electrical engineers increased sharply in January as a result of the demand by firms engaged in research and development, and production of radar, electronic, and other high frequency communications equipment. At the same time, and partly because of this demand, the number of applications from civil, electrical, industrial, and mechanical engineers declined. There was little change in other categories.

The educational qualification of the engineering applicant in January in the Newark-Jersey City area was exceptionally high. Every engineering applicant had at least one college degree, thus meeting minimum educational requirement.

The immediate and long-range outlook for most of the selected classification is good. This opinion is based on (a) the continuing concentration and diversification of area activities and corresponding high employment, and (b) indicated continued expansion, especially in engineering and research.

Openings for engineers placed in interarea clearance rose from 4 in November to 15 in January.

Philadelphia, Pennsylvania

Electronic engineers and technicians along with qualified persons in related scientific fields are outstanding shortage occupations. Research and development for missile and space vehicle activities accounts for most of this demand.

The number of engineering applicants increased since November. Recent registrants came from large construction firms, consulting engineers, marine engineers and architects and machinery manufacturers. Many of the applicants are older persons with limited experience or education. The demand in the area is for qualified engineers, under 40 years of age, with degrees and wanted experience. This need is attested to by huge advertising expenditures by firms in the rocket, missile, computer, and space vehicle fields. Most of the unfilled openings and openings placed in clearance represent orders from one large employer and are restrictive as to degree and specialized experience.

Openings placed in interarea clearance declined from 136 in November to 117 in January. Most of these were for electrical engineers.

Pittsburgh, Pennsylvania

The demand situation, as expressed by the number of unfilled openings and openings placed in interarea clearance, eased in January. The number of unfilled openings dropped from 32 in November to only 11 in January. For the same period, clearance listings for engineers declined from 26 to 11 in January. In January 1958, openings in interarea clearance numbered 93.

The number of active applicants for engineering vacancies rose slightly; from 338 in November to 349 in January. The number of applicants in the mechanical and electrical engineering fields declined as against a small increase in the chemical, metallurgical, and industrial engineering fields.

Baltimore, Maryland

A decline of 28 active applicants for engineering vacancies occurred between November 1958 and January 1959, when 65 were registered at local offices in the area. Very little activity other than the decrease was noted as no new openings were received in January. The level of unfilled openings in January continued unchanged from November. Openings placed in interarea clearance because they could not be filled locally advanced from 106 in November to 109 in January. Current demand for engineers is much greater than a year ago when only 26 vacancies were placed in clearance.

Washington, D. C.

The supply of engineers as measured by active applications dwindled from November to January. There were fewer registrants for jobs in civil, mechanical or electrical engineering but more in mining engineering. In all, 95 applicants were registered at local offices in January compared with 129 in November.

The demand for engineers also eased in January as unfilled openings for electrical engineers dropped. Most of the 379 unfilled openings in January were for civil engineers. Openings placed in interarea clearance fell from 340 in November to 323 in January. Over-the-year clearance openings tripled. A sharp rise in listings for civil engineers offset declines in vacancies for electrical, mechanical, and aeronautical engineers.

Louisville, Kentucky

The supply of engineers continues to exceed the demand in every classification, and the anticipated expansion in industry during the coming four months will not require these workers to any considerable degree. Of 29 applications on file, more than half were job seekers under 45 years of age. Demand for engineers in this area, as indicated by job openings, is virtually nonexistent. One opening, for a mechanical engineer, was listed in interarea clearance, and two openings were received in January.

Atlanta, Georgia

A drop in the number of industrial engineering registrants was largely responsible for a decline in the supply of engineering applicants from 66 in November to 55 in January.

The demand for engineers in Atlanta continued to be light; only 8 openings were unfilled at the end of January. Very few openings were placed in interarea clearance either in January or last November.

New Orleans, Louisiana

Active applications from engineers increased slightly in January from two months ago, and were considerably higher than in January 1958. The greater supply was largely in the fields of civil and electrical engineering and was due to recent college graduates entering the labor market as well as the closing of a nearby refining plant. The number of chemical engineering applicants was down from 7 in November to 4 in January.

The staffing needs of a plant scheduled to begin operations in mid-April accounted for both an increase in openings received and a drop in applications from chemical engineers. Due to the short supply in this classification, unfilled openings and clearance openings increased substantially over the past two months. Chemical engineers accounted for 16 of the 23 unfilled openings at the end of January and for 15 of the 19 openings in interarea clearance.

Clearance openings in January 1959 were higher than in November 1958 but lower than in January 1958, when 23 vacancies were listed. The present demands are for chemical engineers whereas a year ago civil engineers were being sought for the U. S. Corps of Engineers.

Houston-Baytown, Texas

Although the supply of engineers has fallen, it still exceeded the demand in the area. Active applications totaled 155 in January, down from 175 in November. The supply of chemical engineers has dropped from 33 in November to 13 in January, while applications from mining engineers rose to 14 in January from none in November. Only 4 openings for engineers were received in January, compared with 12 in November. Openings placed in interarea clearance were up from 5 in November to 9 in January.

Dallas, Texas

Considerable change occurred in the ratio of supply to demand for engineers. The supply increased when contract cancellation at an aircraft plant caused a layoff of engineers and other workers. As a result, active applications from engineers went from 78 in November to 88 in January. The numerical supply equals or exceeds the demand in every classification, except electrical engineers. However, very few of the available applicants are fully qualified for the positions on hand.

Meanwhile, demand for engineers, as reflected in openings received fell sharply. Only 49 openings for engineers were received in January, most of them for electrical engineers, compared with 137 in November 1958. The local orders, however, probably far understate actual demand. When the engineers were recently released from the aircraft industry, many found employers waiting with offers of employment which the local offices did not receive. Furthermore, the heaviest demand for workers in the selected engineering occupations is currently with firms located outside this area--in most cases in other States. The local newspapers, within two or three days after the layoffs occurred, were filled with announcements of job opportunities in the aircraft and electronics industries, and recruiting teams representing firms all over the nation flooded the area.

St. Louis, Missouri

A chronic shortage of engineers in the area became more acute because of a step-up in the missile program. The number of openings received climbed from 10 in November to 32 in January. However, this does not express the complete demand as the majority of employers recruit in these professions through schools, pay agencies, newspaper advertising and professional organizations.

The number of active applications increased from 47 in November to 56 in January; the number of openings placed in interarea clearance remained very small.

Kansas City, Missouri-Kansas

The supply of engineers in the area dwindled as the number of applicants at public employment offices dropped from 33 in November to 19 in January. The number of job openings in interarea clearance continued virtually unchanged from November, the 15 openings listed in January were for electrical engineers.

Indianapolis, Indiana

Demand for engineers picked up in this area with a gain in new openings received from 2 in November to 12 in January. At the end of the month, however, only 7 more were left on hand than in November when 12 were listed.

The number of registered job seekers in the several engineering fields decreased from 40 in November to 27 in January. Selections of applicants for orders were limited by the fact that only 6 of the January registrants had a college degree.

Cincinnati, Ohio

The imbalance between supply and demand for engineers in this area continued despite some small increases in the number of registrants. Demand has been confined largely to two plants engaged in research and development in various phases of electronics, aeronautics, and atomic and computer applications. Although the number of unfilled openings both in November and January exceeded 200, relatively few of these vacancies were received in January. Only 3 openings were placed in interarea clearance in January compared with 10 in November.

Columbus, Ohio

There was little change in the engineering situation in this area. The number of unfilled openings remained at 26 in January, unchanged from November while active applications were up slightly (from 25 in November to 28 in January). Openings placed in interarea clearance were 18 in January and 13 in November.

Cleveland, Ohio

The supply of applicants in every engineering occupation exceeds the demand as expressed in job openings. The placement of applicants has become more difficult because hiring specifications have become stricter during the past year. In general, employers demand more specialized experience and longer periods of experience in the particular engineering field, together with some post-graduate training. Age limitations, too, are less flexible than they were a year ago. The number of active registrants totaled 278 in January, about the same number as in November.

Openings received in January 1959 increased over the November 1958 total and while employment has picked up somewhat in the last two months, most of the increase has come from recalls. Openings placed in interarea clearance because they could not be filled locally numbered 5 in January compared with 8 in November.

Detroit, Michigan

The number of engineering applications fell by one-fourth from November to January, from 779 to 585. Every type of engineering classification declined, except electrical and aeronautical. Increased production in automobile plants and related supplier industries is responsible for the lower level of engineering applications. This is especially true of mechanical engineers, which dropped from 458 in November to 321 in January. The closely related industrial engineering group declined from 168 to 135.

Fewer openings were received in January than in November. The number of unfilled openings also dropped over this period. However, the opposite trend was indicated by clearance openings. They increased from 7 in November to 22 in January.

Chicago-Calumet, Illinois-Indiana

The demand-supply situation with respect to engineering occupations in the period from November 1958 to January 1959 changed slightly. The number of engineers registered at local offices declined from 368 to 274. Most of the drop was in the mechanical engineering category. Job openings for engineers received during this period fell from 77 to 38, and unfilled openings at the end of the month declined from 113 to 96. However, clearance openings rose from 29 to 38 and exceeded the number of a year ago. A major deterrent to placements continues to be unrealistic age limits set by employers.

Milwaukee-Waukesha, Wisconsin

Moderate employment expansion in the durable goods industries brought slight increases in orders for workers. Engineers, with the exception of civil and chemical, were in greater demand. Requests for mechanical and electrical engineers increased significantly from November to January. Many of the new orders came from smaller firms in the machinery and electrical equipment industries. Unfilled openings for engineers decreased slightly since November. Clearance listings also dropped slightly.

The supply of engineering applicants edged downward despite the marked entrance of some first-semester graduates. Recall as well as new hires activity figured in the decline of available engineers from 154 in November to 143 in January. If expansion in durable goods manufacturing continues at the current pace, the demand for engineers is expected to increase substantially.

Minneapolis-St. Paul, Minnesota

After declining since July 1958, the number of applications from engineers rose sharply in January. The increase was due to the December commencement at the University of Minnesota.

Job openings for engineers increased between November and January principally because of a large order for electrical engineers. Job openings unfilled at the end of the month increased in all categories except chemical engineering, which was down from 5 in November to 4 in January. The greatest demand was for electrical and mechanical engineers. Clearance openings followed the trend of openings received, except for the order for electrical engineers, mentioned above, which was received too late to place in clearance in January. The supply-demand situation in January differs from that of a year ago. At that time registrations by engineers numbered 162 while openings received were only 9 compared with 66 this year. Openings placed in interarea clearance because of local shortages totaled 13 in January 1958, 32 in November 1958, and 19 in January 1959.

Denver, Colorado

Active applications from engineers edged up between November and January but were fewer than in January 1958. The bimonthly increase was principally in the civil engineering category. Although this was a surplus category in January, it is expected that demand will increase in the next two to four months.

There were more openings for engineers in January than in November of a year earlier. The November-to-January increase was principally for mechanical engineers; the over-the-year change was largely in additional openings for mechanical and aeronautical engineers. Openings placed in interarea clearance remained unchanged at 50 listings in January. These vacancies are for engineers with highly specialized missile experience.

Los Angeles-Long Beach, California

A continued recovery in durable goods manufacturing and expansion in research and development projects has stimulated demand in engineering classifications. Stringent shortages continue to exist in the electrical and mechanical engineering fields, but available applicants in the labor market fail to meet the required specifications in education and experience.

The number of active applications in engineering occupations fell to 817 in January from 871 in November. A decline in registrations over the 60-day period occurred in all classifications except metallurgical and mining engineering.

New openings received in the engineering occupations rose moderately from 138 in November to 145 in January because of more requests for civil and mechanical engineers. Unfilled job openings for engineers continued to mount and totaled 787 at the end of January as compared with 648 in November. The increase in unfilled openings was general throughout the engineering field except for mining and metallurgical engineers.

Openings placed in interarea clearance because of labor shortages were 471 in January compared with 504 in November and 88 a year earlier. The over-the-year rise was chiefly for electrical and aeronautical engineers. The need for these workers reflects the heavy demand in developmental work in aircraft, electronics and missiles.

San Francisco-Oakland, California

Since May 1958, the earliest period for which information on engineering applicants is available, there has been a gradual downtrend in the number of engineers seeking jobs, unmatched by a commensurate, visible upturn in the demand for these workers. The total number of engineering applications at local public employment offices was 512 in May 1958, 314 in November, and 270 in January 1959.

Of the 8 engineering occupations for which information is obtained, substantial reductions took place in all but 3 of the individual classifications. None of the 3 occupations is numerically important in the area and the number of registrants represented in the file count is not sufficiently large to avoid being subject to erratic fluctuations. The categories are metallurgical, aeronautical, and mining engineering with 6, 4, and 5 registrants, respectively, in January.

Mechanical engineers comprised the largest single category of unemployed engineers in the area, with 98 seeking jobs in January, down from 114 in November and appreciably below the 180 of May 1958. Continued sluggishness of hiring at plants engaged in machinery manufacturing and petroleum refining has limited the demand for these men. However, there is an active demand for mechanical engineers who have specialized in nucleonics, but the supply of trained men in this field is virtually nonexistent.

Civil engineers, with 67 registrants in January, constituted the second largest group of unemployed engineers despite their position as the most numerous of the engineering specialties in the area. The usual seasonal joblessness which affects this group did not materialize this year due to uncommonly dry weather which allowed construction to continue at a high level.

The number of electrical engineering applicants remained unchanged from November to January, but the 61 registrants were half the number seeking work in May 1958. However, the "heavy power" men in the group are finding new jobs difficult to obtain. The jobless do not qualify for work in the booming electronics firms in this area.

The number of unemployed chemical engineers has been falling off with increasing demands in such fields as chemicals, missiles fuel, and nucleonics research. In January, 15 applicants were registered compared with 20 in November.

Industrial engineers were hard hit at the beginning of the recession but few are now available. The number of registrants fell off by almost half between November and January.

The number of job openings received in January was up sharply from November. The new orders--50 were received in January--were mainly for electrical and mechanical engineers. Job requirements relating to specific training and work experience give rise to the imbalance between supply and demand for engineers.

Openings placed in interarea clearance because of local shortages numbered 23 in January, the same as a year earlier. The shortages then were for mechanical, electrical, and civil engineers. This year almost all of the clearance openings were for electrical engineers.

Portland, Oregon

The overall supply of engineering applicants at local public employment offices dropped only moderately but the backlog of unfilled orders spurted. Although the number of applicants changed little numerically, there has been a sharp drop in the number with a college degree. Placement officials have been encountering difficulty in matching applicants with jobs, especially in the mechanical and electrical engineering fields.

Demand for mechanical engineers has picked up since November: unfilled openings rose from 2 to 7 in the last 60 days. Although the number of applicants in this specialty remained at 21 over this period, the number with a degree dropped from 14 to 7. Highly qualified applicants experience less difficulty in finding work.

Openings for electrical engineers also rose from November to January, with 6 remaining unfilled at the end of the period. A college degree was part of the qualifications in 4 of the unfilled openings, but only 1 out of 6 applicants registered had a degree in electrical engineering. The supply of electrical engineers with a degree falls short of meeting the requirements in the area.

A seasonal slack continued in civil engineering: no orders were received and registrations increased from 17 in November to 23 in January. Although the supply of civil engineers is currently adequate, it promises to become tight as demand from contractors and government agencies picks up during the next 4 months.

Seattle, Washington

The demand of the aircraft industry for qualified personnel for its missile research and planning, outer space program, and jet plane activities far outstrips the local supply of such talent. Registrations by engineers decreased by 18 from 52 in November to 34 in January. This compares with 995 unfilled openings, with the majority of these for electrical, mechanical, and aeronautical engineers for the aircraft industry. Some reduction in engineering employment is anticipated when aircraft production is discontinued in favor of missile and jet plane production. A total of 981 openings were placed in interarea clearance in January, up from 885 in November.

III. Appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Bureau of Employment Security, Office of Program Review and Analysis. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is an Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

A summary of information on clearance openings in all States has been utilized in the preparation of the bimonthly reports entitled Local Shortages in Selected Scientific and Engineering Occupations prepared at the request of the National Science Foundation.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas [1] for the first time in May 1958. These area labor market reports provide bimonthly information on local economic factors contributing to changing demand-supply relationships for engineering, scientific and technical personnel in the area. Insofar as possible other sources of information are utilized including occupational information from labor market areas.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. Some are unemployed with good experience and work history; others may be now employed but seeking new jobs; still others may be seeking supplementary jobs on a part-time basis; a few are not now available but desire to be interviewed fur future work; some have degrees but no recent experience, or if they have the experience, lack the usual college degree or required membership in professional associations; others are noncitizens in a labor market where a large volume of the openings are at defense-related establishments; and finally, there are those individuals with excellent backgrounds whose salary expectations are out of line with rates commonly being paid in the area.

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[1] The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), Engineers, chemical (0-15), Engineers, civil (0-16), Engineers, industrial (0-18), Engineers, mechanical (0-19), Engineers, aeronautical (0-19.03), Engineers, mining (0-20), Chemists (0-07), Natural Scientists, n.e.c. (0-35), Draftsmen (0-48), and Laboratory Technicians and Assistants (0-50). A list of the 30 areas appears on page 22.

The number of actual openings available at local offices may be appreciably lower than the total requirements for these reasons: an order being carried as open for one when several workers may in fact be required; job orders are developed as suitable applicants appear; many firms do not file formal orders but wish to be notified if suitable applicants become available; and finally, when occupations are in short supply, the number of openings understates the total demand and may even decline because employers, thinking there's no use, may not place job orders.

List of 30 Major Labor Market Areas

Boston, Massachusetts
Providence, Rhode Island
Buffalo, New York
New York, New York
Paterson-Clifton-Passaic, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Baltimore, Maryland
Washington, D. C.
Louisville, Kentucky
Atlanta, Georgia
New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas
St. Louis, Missouri
Kansas City, Missouri-Kansas
Indianapolis, Indiana
Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Detroit, Michigan
Chicago-Calumet, Illinois-Indiana
Milwaukee-Waukesha, Wisconsin
Minneapolis-St. Paul, Minnesota
Denver, Colorado
Los Angeles-Long Beach, California
San Francisco-Oakland, California
Portland, Oregon
Seattle, Washington

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-March 1959

			Selected Occupations			
Month and Year	All Occupations	Professional and Managerial	Total	Engineers	Scientists	Draftsmen & Technicians
Jan. 1956	27,887	12,845	6,844	4,792	476	1,576
Jan. 1957	35,629	14,498	9,327	6,349	723	2,255
March	34,390	15,952	9,330	6,428	762	2,140
May	31,452	14,007	8,434	5,976	606	1,852
July	29,144	11,879	7,467	5,437	650	1,380
Sept.	23,208	8,986	5,506	3,946	595	965
Nov.	13,859	5,388	2,908	1,993	323	592
Jan. 1958	14,665	7,726	2,634	1,817	297	520
March	14,451	8,244	3,563	2,717	465	381
May	15,552	9,439	3,572	2,764	397	411
July	14,420	7,514	3,584	2,921	277	386
Sept.	15,363	8,732	5,498	4,447	626	425
Nov.	17,661	9,308	4,924	3,906	610	408
Jan. 1959 R/	16,042	10,530	5,545	4,386	608	551
March P/	17,960	10,820	5,654	4,292	740	622

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

R/ Revised
P/ Preliminary

Table II. Clearance Openings in Selected Occupations January 1959, November 1958, and January 1958

Occupation	Jan. 1959 1/	Nov. 1958	Jan. 1958	Percent Change to January 1959 from:		Percentage Distribution January 1959
				Nov. 1958	Jan. 1958	
All selected occupations	5,545	4,924	2,634	+12.6	+110.5	100.0
Professional						
Engineers, total	4,386	3,906	1,817	+12.3	+141.4	79.1
Metallurgical	35	27	50	a/	-30.0	0.6
Chemical	87	58	150	+50.0	-42.0	1.6
Civil	676	792	346	-14.6	+95.4	12.2
Electrical	1,746	1,570	590	+20.1	+219.7	31.5
Industrial	179	172	128	+4.1	+39.8	3.2
Mechanical (except aero.)	937	909	425	+3.3	+120.5	16.9
Aeronautical	722	377	126	+91.5	+473.0	13.0
Mining	4	1	2	a/	a/	0.1
Other professional	608	610	297	-0.3	+104.7	11.0
Physicists	177	194	53	-8.8	+234.0	3.2
Mathematicians	161	134	34	+17.5	+373.5	2.9
Chemists	89	91	109	-2.2	-18.3	1.6
Life scientists	30	38	32	a/	a/	0.5
Writers, tech. pubs.	119	135	52	-11.9	+128.8	2.1
Physical scientists	26	10	9	a/	a/	0.5
Statisticians	6	5	8	a/	a/	0.1
Semiprofessional						
Draftsmen, total	377	243	315	+55.1	+19.7	6.8
Mechanical	120	75	89	+60.0	+34.8	2.2
Other	257	168	226	+53.0	+13.7	4.6
Laboratory technicians and assistants, total	174	165	205	+5.5	-15.1	3.1
Medical technicians	149	159	121	-6.3	+23.1	2.7

a/ Percent change not shown where both absolutes are less than 50.

1/ Covers period January 28-February 10, 1959.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations
January 1959 and November 1958

Labor Market Area	Engineers		Chemists		Natural Scientists		Draftsmen		Laboratory Technicians	
	Jan.	Nov.	Jan.	Nov.	Jan.	Nov.	Jan.	Nov.	Jan.	Nov.
Total	6,393	6,842	856	922	626	715	6,744	6,878	2,915	2,901
Boston	209	216	38	49	6	42	154	202	188	123
Providence	61	66	19	13	2	5	45	38	34	32
Buffalo	138	147	21	21	8	8	105	96	86	86
New York	1,216	1,207	254	291	136	163	1,317	1,286	366	354
Paterson-Clifton-Passaic	146	206	32	23	7	5	92	116	63	72
Newark-Jersey City	296	392	59	75	22	49	173	339	113	226
Philadelphia	447	411	30	44	20	21	508	371	219	215
Pittsburgh	349	338	38	38	24	24	609	577	377	376
Baltimore	65	93	13	14	3	8	67	100	41	40
Washington, D. C.	95	129	17	28	31	53	71	83	58	69
Louisville	29	30	1	6	1	3	33	11	31	25
Atlanta	55	66	2	6	3	4	28	24	29	38
New Orleans	67	58	13	12	15	10	44	35	31	16
Houston-Baytown	155	175	20	24	46	48	193	168	69	64
Dallas	188	78	5	6	19	32	150	61	32	20
St. Louis	56	47	10	5	9	4	69	59	64	32
Kansas City	19	33	2	5	3	3	17	26	12	14
Indianapolis	27	40	4	0	1	2	25	26	22	25
Cincinnati	47	34	2	0	8	2	54	39	53	35
Columbus	28	25	3	6	3	5	25	26	13	14
Cleveland	278	273	19	12	9	9	329	357	88	95
Detroit	585	779	22	21	7	8	814	998	158	156
Chicago-Calumet	274	368	55	60	14	11	335	425	101	147
Milwaukee-Waukesha	143	154	24	22	28	24	88	93	47	41
Minneapolis-St. Paul	142	94	11	12	23	13	158	128	50	49
Denver	95	87	9	8	17	21	43	33	35	29
Los Angeles-Long Beach	817	871	66	71	108	73	832	813	319	239
San Francisco-Oakland	270	314	45	38	38	45	284	243	154	202
Portland	62	59	11	7	12	11	42	57	42	41
Seattle	34	52	11	5	3	9	40	48	20	26

Table IV. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations January 1959 and November 1958

Labor Market Area	Engineers		Chemists		Natural Scientists		Draftsmen		Laboratory Technicians	
	Jan.	Nov.	Jan.	Nov.	Jan.	Nov.	Jan.	Nov.	Jan.	Nov.
Total	3,932	3,622	122	113	419	386	612	416	391	360
Boston	264	156	8	5	27	6	155	55	53	19
Providence	4	5	0	0	0	0	1	6	3	0
Buffalo	147	153	5	5	47	47	5	13	10	10
New York	45	34	30	19	10	8	24	9	69	43
Paterson-Clifton-Passaic	51	34	2	1	2	0	15	0	2	0
Newark-Jersey City	40	51	3	8	1	0	77	14	7	2
Philadelphia	129	142	0	2	0	0	11	9	17	5
Pittsburgh	11	32	3	5	3	8	5	4	5	9
Baltimore	112	113	1	0	2	1	10	5	3	0
Washington, D. C.	379	392	0	1	18	45	16	13	34	58
Louisville	3	4	1	0	0	0	2	4	0	0
Atlanta	8	9	0	0	0	0	12	6	8	10
New Orleans	23	8	0	1	0	0	4	2	0	1
Houston-Baytown	10	12	0	0	1	2	4	2	3	1
Dallas	65	133	1	1	1	2	16	15	1	1
St. Louis	22	12	0	0	0	0	1	3	11	10
Kansas City	24	20	2	1	1	0	5	9	3	0
Indianapolis	24	17	3	1	1	3	2	4	3	3
Cincinnati	202	207	0	0	2	7	5	6	5	8
Columbus	26	26	1	2	1	2	5	4	5	10
Cleveland	33	22	9	9	1	1	7	6	10	11
Detroit	34	43	1	0	0	0	18	30	4	4
Chicago-Calumet	96	113	8	14	13	2	42	22	26	41
Milwaukee-Waukesha	151	157	6	5	14	10	32	39	15	13
Minneapolis-St. Paul	123	83	9	7	13	5	34	22	14	18
Denver	54	57	0	0	1	0	3	3	8	3
Los Angeles-Long Beach	787	648	28	24	30	32	76	83	34	51
San Francisco-Oakland	55	29	1	2	3	3	17	20	28	20
Portland	15	4	0	0	0	0	4	1	4	2
Seattle	995	906	0	0	227	202	4	7	6	7

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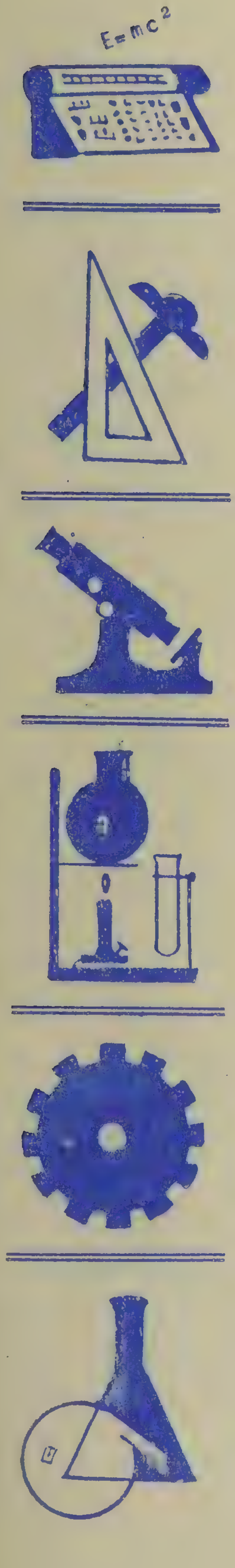

CURRENT LABOR MARKET CONDITIONS in ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

May 1959

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director

Washington 25, D. C.

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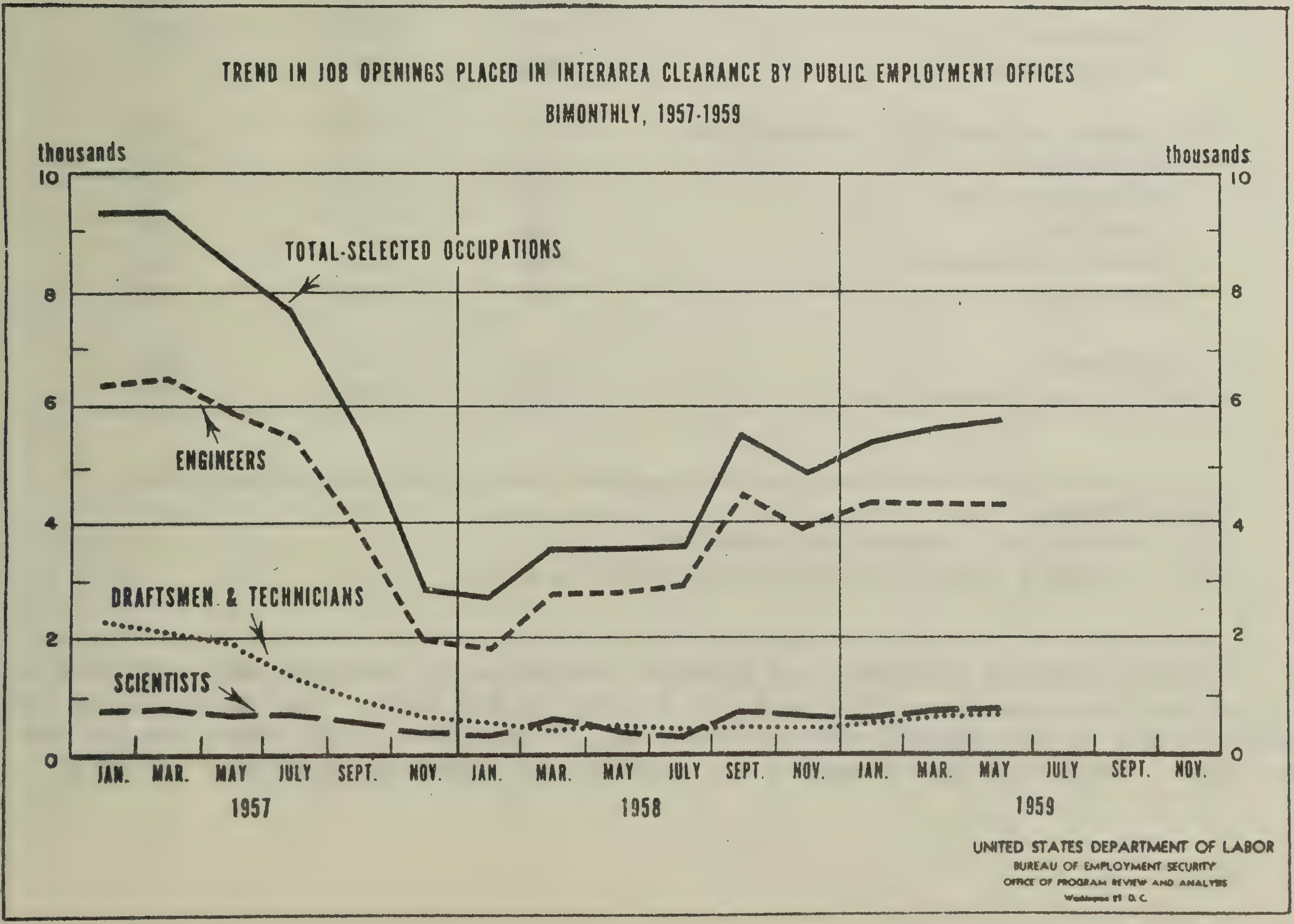
This is the sixth in a new series of bimonthly reports prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It consists mainly of summaries of field reports on current conditions in 30 major labor market areas and statistics on job openings for selected engineering, scientific and technical occupations placed in interarea clearance by public employment offices throughout the country.

CURRENT LABOR MARKET CONDITIONS FOR ENGINEERING, SCIENTIFIC, AND TECHNICAL PERSONNEL

I. Highlights of Interarea Recruitment Activity - May 1959

Continuing the upward trend evident since September 1958, the number of unfilled openings placed in interarea clearance for selected engineering, scientific, and technical occupations increased slightly to 5,764 in May 1959. While only about 100 more than the number listed two months earlier, this total was about 2,000 greater than the year-ago volume.

Engineers continued to account for about three-fourths of the clearance openings in the selected occupations. The bimonthly period between March and May brought relatively small changes in the total number of clearance openings for engineers, but some shifting was evident among the various engineering specialties. Mechanical and civil engineering vacancies declined, but the number of openings in electrical, aeronautical and industrial engineering showed an increase over March. The inventories of unfilled openings for each State showed that shortages of electrical engineers were widespread. States seeking the largest numbers of such engineers included Washington,


TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957-1959

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25 D. C.

New Jersey, New York, California, Maryland, Florida, Massachusetts, and Pennsylvania. In addition to large number of vacancies for aeronautical engineers in Washington, the State of California added new listings for aeronautical engineers qualified for research activities in missiles and space programs.

Table 1

Job Openings in Interarea Clearance - Public Employment Offices
Selected Occupations, May 1959, March 1959, May 1958

	May 1959	March R/ 1959	May 1958
All selected occupations	5,764	5,654	3,572
Engineers, total	4,320	4,278	2,764
Chemical	96	103	70
Civil	326	397	807
Electrical	1,933	1,891	787
Industrial	288	211	186
Mechanical 1/	881	932	616
Aeronautical	800	701	258
Selected scientific occupations	802	757	397
Physicist	177	184	105
Mathematician	190	170	79
Chemist	91	115	98
Technical writer	224	181	67
Other 2/	120	107	48
Draftsman	403	391	244
Laboratory technician	242	228	167

R/ Revised
1/ Mechanical, except aeronautical.
2/ Includes other natural scientists, n.e.c.

In the natural sciences and related professional occupations, unfilled job openings increased from 757 in March to 802 in May 1959. Unfilled orders for mathematicians and technical writers were well above their respective totals for March 1959. Vacancies for chemists and physicists, however, declined slightly during the period. Twice as many openings were placed in interarea clearance for workers in these selected scientific occupations in May 1959 as one year earlier.

Relatively small increases were reported in demand for supporting technical personnel by unfilled orders placed in clearance for draftsmen and laboratory technicians in May 1959. Compared with May 1958, employment opportunities in these occupations also showed considerably sharper increases.

and for mechanical and industrial engineers and draftsmen in Detroit. Recruitment by automobile producers and related suppliers reduced the number of available applicants in these occupations sharply between January and March.

In many areas, some specific openings continued unfilled because available applicants did not match employers' hiring specifications. This was particularly true where defense contracts were the major source of demand for engineering and related personnel and affected demand for electronics and aeronautical engineers, and for physicists, mathematicians and draftsmen. Although some new graduates were being recruited, the job openings available frequently were for senior engineers usually with specialized experience who could undertake direction of a project or team involved in a particular phase of research.

Openings in the selected occupations placed in interarea clearance because they could not be filled locally are reported for the nation as a whole as well as for the 30 major labor market areas. Between January and March the number of engineering openings throughout the country showed a small decline of 108 openings. (See Table II, page 23).

The drop in clearance openings was particularly sharp in March for civil engineers. Orders for civil engineers declined from 676 to 392 over the period primarily because of the cancellation of job openings by the Bureau of Public Roads. Openings for aeronautical engineers also dropped slightly between January and March.

Electrical engineering openings placed in interarea clearance showed the greatest gain of any group increasing from 1,746 vacancies in January to 1,891 in March. The number of unfilled openings in March was nearly twice as large as the number reported in March 1958 when a total of only 924 openings for electrical engineers were in clearance. The number of openings placed in interarea clearance by offices of the employment service because they could not be filled locally was greater in March for chemists, and for natural scientists and related professional personnel. The increase averaged slightly more than 25 percent for these groups combined, with a total of 757 unfilled openings placed in clearance in March.

Changing conditions for supporting personnel, especially the increased demand for draftsmen in many of the 30 major labor market areas has already been mentioned. In addition, continued shortages of laboratory personnel were reported particularly for hospitals. Openings in interarea clearance for draftsmen in all labor market areas showed a less significant change than was apparent from the 30 labor market areas providing special reports.

Boston
New York City
Indianapolis
Columbus
Paterson
Newark
Louisville
Houston-Baytown
St. Louis
Detroit
Chicago
Milwaukee
Los Angeles-Long Beach
San Francisco-Oakland
Portland (ore.)

Areas where labor demand-supply conditions in engineering, scientific and supporting occupations had not changed significantly during the reporting period were:

Buffalo
Pittsburgh
Baltimore
Atlanta
Kansas City
Cincinnati
Minneapolis-St. Paul
Denver

Finally, a third group of areas reported that the overall trend was one of less stringency, an increasing supply of applicants, or less demand for workers in the selected occupations indicating a looser labor market situation between January and March. These included:

Providence
Philadelphia
Washington, D. C.
New Orleans
Dallas
Cleveland

Information for the 30 labor market areas combined, by occupational category--engineers, chemists, natural scientists, draftsmen, and laboratory technicians and assistants--indicated that only one group had a larger number of applicants (natural scientists) than in January, and that this change was very small. The other occupational groups either showed no change or had fewer applicants.

One of the most significant declines was in the number of aeronautical engineers which dropped by 22 percent to a total of 102 in March. Metallurgical engineers registered for work, dropped from 121 in January to 97 in March; the number of mining engineers also declined from 80 to 62 applicants at the end of March. Declines for the other engineering occupations were proportionately less. Metallurgical engineers were also one of the two engineering groups for which job orders unfilled at the end of March in the 30 major areas were higher than at the end of January. Chemical engineering applicants also dropped by 52 to a total of 367 in March. Increased employment in rocket and missile programs especially research and development programs in solid fuels and metals testing are contributing to declines in available applicants in these engineering specialties.

Other economic developments contributing to changing demand and supply for engineering, scientific and technical personnel were important seasonal increases in demand for civil engineers and draftsmen, particularly in the New York area and for mechanical and industrial engineers and draftsmen in Detroit. Recruitment by automobile producers and related suppliers reduced the number of available applicants in these occupations sharply between January and March.

In many areas, some specific openings continued unfilled because available applicants did not match employers' hiring specifications. This was particularly true where defense contracts were the major source of demand for engineering and related personnel and affected demand for electronics and aeronautical engineers, and for physicists, mathematicians and draftsmen. Although some new graduates were being recruited, the job openings available frequently were for senior engineers usually with specialized experience who could undertake direction of a project or team involved in a particular phase of research.

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B. Analysis by Major Occupation

Engineers

Engineering applicants actively seeking employment in the 30 major labor market areas declined by about 700 to a total of 5,895 in March 1959. The decline was distributed among all fields of engineering except electrical. In this classification about the same number of applicants were reported in both January and March.

Table 2

Occupation	Active Applications		Percent Change
	March 1959	January 1959	
Engineers, total	5,895	6,397	-7.8
Metallurgical	97	121	-19.8
Chemical	367	419	-12.4
Civil	1,147	1,138	+0.8
Electrical	922	920	+0.2
Industrial	1,068	1,184	-9.8
Mechanical	2,130	2,404	-11.4
Aeronautical	102	131	-22.1
Mining	62	80	-22.5

The major areas were almost evenly divided: 11 reported an increase in engineering applicants, 10 reported a decline, and 9 reported an insignificant amount of change. (See Appendix Table III).

Areas with declines in numbers of engineering applicants

The largest decline in the total number of engineering applicants registered for employment occurred in New York City where opportunities for architectural designers and related personnel more than tripled between February and March. Increases were particularly noticeable in positions for persons with experience in designing and drafting commercial and institutional structures, multi-story apartment houses and interiors of banks and stores. During the latter part of 1958 and at the beginning of 1959 few firms were in the market for such personnel.

An increase in job opportunities for civil engineers was evident in March, although there has been no mass hiring of engineers and draftsmen for highway projects. Experienced personnel have less difficulty in obtaining employment than last year. Electrical engineers with specialized electronics experience are also in greater demand for the development of both military and civilian equipment.

In New York City, mechanical and civil engineers are the principal groups unemployed among engineers. 1/ Most of the jobless mechanical engineers were from the piping design field where layoffs were still taking place as a result of the scarcity of work on piping systems design and industrial plant layout. Demand for this type of engineers was at its lowest point since the fall of 1949 and there was no immediate prospect of improvement. Demand has remained inadequate to absorb the large numbers of unemployed structural engineers and designers. Neither are there enough opportunities to absorb the number of light and power designers out of work.

In Detroit, the number of active applicants declined by 190 between January and March. Increased production in automobile plants and related supplier industries was chiefly responsible for the decline in applications in nearly all classifications of engineering except electrical and aeronautical.

Other areas reporting declines in the number of engineering applicants in March included: Cleveland, Pittsburgh, Denver, Newark-Jersey City, Paterson-Clifton-Passaic, Louisville, and San Francisco. In the latter area employers were beginning to hire applicants meeting their qualifications in anticipation of the pickup in business activity. For example, a major engineering company in the San Francisco area which had discouraged new business because of a backlog in contracts during the 1957-1958 recession found in February 1959 that it could no longer hold its full crew of people. The result of layoffs coming at this time, however, as business was picked up, was the immediate reabsorption of these engineer-designers by other companies. Many of the companies which hired these workers were not actually looking for additional help but apparently decided to stockpile qualified workers against anticipated new business. In the San Francisco area, and perhaps in some of the other major areas, as well, the favorable demand outlook has probably reduced the number of job applicants in local offices to near minimum.

Among the 10 areas cited as having declining numbers of engineering applicants in March, the number of openings unfilled at the end of March was higher than at the end of January in New York, Pittsburgh, Louisville, Cleveland, and Chicago. No significant change in the number of unfilled openings occurred in Newark-Jersey City, San Francisco-Oakland, Detroit, Paterson, and Denver (See Appendix Table IV).

Areas with increases in numbers of engineering applicants

Increases in the number of engineering applicants occurred in 11 out of the 30 major labor market areas. The largest increase was reported by Washington, D. C. which in March had 149 engineering applicants seeking jobs compared with a total of 95 January. A sharp drop in the number of openings placed interarea clearance occurred as a result of the decline in job orders placed by the Federal government for civil engineers.

1/ Special sample survey of unemployed during first quarter.

Boston reported an increase of about 50 in the total number of engineering applicants. Despite apparent numeric surpluses of applicants in some categories, versus openings unfilled, in actuality serious shortages do exist in the area. In nearly all of the occupations listed, the demand-supply relationship is in poorer balance than it was two months ago, and has deteriorated in the past year.

This demand-supply disparity is foreseen as being an almost constant feature of the local labor market situation. New establishments locating in the area are boosting the demand for engineers, especially in fields such as the following: advanced systems analysis, circuit design, communications systems, digital computer systems, environment testing, infra-red techniques, operations research and systems design. These modern research facilities are a part of the nation's defense system and little information on anticipated labor demands is available, although staff needs for one non-profit corporation are expected to quadruple over the next year. Termination of other contracts in the area has not resulted in any cutback in employment, as research and development personnel are absorbed into new programs.

In Buffalo the labor market for engineers eased, and the number of applicants increased between January and March. The demand for aeronautical engineers, previously in short supply, has largely evaporated since the end of the year. About 300 engineering department workers were released by one major company during March of whom about 250 were engineers. The supply of metallurgical, chemical and mechanical engineers is about in balance with the demand for mechanical engineers down sharply since last year. Surpluses of civil and industrial engineers and now for some types of mechanical engineers have emerged. Many workers have left the area to fill jobs in other sections of the country.

The number of engineering applicants increased slightly in Los Angeles-Long Beach area, but shortages of qualified aeronautical and electronics engineers represented a major recruitment problem. Activity in aircraft and new weapon systems continued even during the recent recession with expenditures for research and development of nearly 5 million dollars reported by two major aircraft producers. Some relaxation in experience requirements has made available numerous opportunities for recent engineering graduates, but demand is very strong for engineers with advanced degrees and specialized experience.

Providence and St. Louis each reported an increase of about 20 in the number of available engineering applicants in March. Other areas reporting increases of less than 10 in the number of engineering applicants were Dallas, Kansas City, Atlanta, and New Orleans.

In the following areas in which the number of engineering applicants increased between January and March, the number of unfilled openings at the end of March declined and were below the January level: Washington, D. C., Boston, Buffalo, and Dallas, Areas in which the number of applicants had increased during the period and in which no significant change in unfilled openings occurred included: St. Louis, Providence, Los Angeles, Kansas City, Atlanta, and New Orleans (see Appendix Tables III and IV).

Philadelphia was the only area with an incrase in active engineering applicants in March which also had a significantly larger number of unfilled openings on hand at the end of March. Most of the unfilled orders placed in clearance represent demand by a major radio and electronics producer, and require a high level of educational training and specialized experience. One major radio company in the area was reported to have received three separate government contracts for missile and communications equipment in a 17 day period during April. Current openings filed during March declined almost to the vanishing point, but there are indications that in the coming months a pick-up in the machinery industry may bring some calls for mechanical engineers and supporting personnel.

Areas of no significant change in numbers of engineering applicants

In 9 areas there was no significant change in the number of available engineering applicants in March, and in 5 of these areas--Baltimore, Houston, Indianapolis, Columbus, and Seattle there was likewise no significant change in the number of unfilled openings compared with January totals (see appendix Tables III and IV). Other areas with little or no change in the number of applicants, but with a small decrease of less than 20 in the number of unfilled openings were Cincinnati, Minneapolis-St. Paul, and Portland. In Milwaukee the number of applicants remained nearly stable but unfilled job openings were up slightly in March. Demand in Milwaukee is expected to increase gradually because of a new atomic heating research laboratory located in the area and also expansion by a firm doing research work on inertial guidance system.

Reflecting the extent of interarea recruitment for engineers, the statistics of unfilled openings placed in clearance by the 30 major areas totaled 2,273 in March compared with 2,499 in January. Only 7 areas reported a significant decline in the number of such orders carried in the clearance inventory in March.

The inventory of unfilled job openings for engineers throughout the nation declined by 2.5 percent in March, chiefly because of reductions in the number of vacancies for civil and aeronautical engineers. Cutbacks in conventional type aircraft production and declines in the number of openings placed in interarea clearance for civil engineers for the highway program were among the factors causing the decline.

Compared with March 1958, however, the total number of engineering vacancies in interarea clearance was up by 58 percent, with only the number of civil engineering vacancies significantly smaller than one year ago (see Table II, page 23).

Natual Scientists and Selected Professional Personnel

Reports of persistent shorgages of scientific personnel continued in March. However, relatively small changes occurred in the demand and supply of such personnel recorded in local employment service operations in the 30 major labor market areas. One-half the areas providing special labor market reports showed no significant change in the number of natural science applicants registered for employment. Seven areas reported a small increase in the number of such applicants. The total number of applicants for employment in these areas remained almost unchanged with a total of 613 applicants in March. This total included some mid-term graduates as well as retired persons seeking part-time employment.

Physicists and mathematicians were in short supply, especially in areas where research activites were expanding. In Boston, for example, a new non-profit research corporation was expected to quadruple in size over the next few months with extensive needs for engineering and scientific personnel. Job openings for physicists in the area specified experience and educational specialization in such fields as nuclear energy, solid state, spectroscopy, and upper atmospheric physics. In some of these positions engineering training or experience were also essential. Openings were also reported for foreign assignment with a team organized to operate precision satellite tracking cameras and could alternately be filled by applicants with education and experience in either astronomy or electronics.

In Buffalo, the stringencies of natural scientists, especially mathematicians and physicists were sustained between January and March. Nuclear physicists were in especially short supply in Atlanta. A shortage of physicists was reported by other areas including Indianapolis, Cincinnati, Minneapolis-St. Paul, Denver, Portland, and Seattle.

The openings for physicists in Denver were primarily for employment in a government facility in the area. Specialization requirements included experience in ionospheric radio propogation research, electric circuit design, or radio astronomy, In Portland, however, the shortages reported were primarily for qualified teachers because of the out-migration to research centers of physics and mathematics instructors. Cincinnati attributed its increased supply to immigration.

The number of unfilled openings for natural scientists placed in interarea clearance by local offices in the 30 major areas remained virtually unchanged between January and March.

Chemists

Active applicants in the 30 major labor market areas declined from 858 in January to 785 in March, while unfilled openings at the end of the later month stood at 160 compared with 122 in January. The sharpest decline in the number of active applicants was reported in New York where the total fell from 254 in January to 194 in March. Other areas reporting sizeable reductions in the number of chemists registered for employment included Paterson and San Francisco-Oakland.

Several areas including Buffalo, Denver, and Seattle indicate a continuing scarcity of employment opportunities in this occupation because of the industrial pattern of the area. Local colleges and universities in these areas provide more than an adequate supply of applicants and job opportunities are mostly in the nature of replacements. Relatively few job opportunities for chemists develop in these areas.

The drop in applicants in San Francisco-Oakland was attributed to improved business conditions for the chemical industry, especially to increased hiring activity at several large research laboratories and by a number of smaller firms. The number of applicants showed a small increase between January and March in several areas including Newark and in Minneapolis-St. Paul. This increase, however, was balanced by an improvement in demand as measured by both the number of job orders received during the month, and the number of such orders remaining unfilled at the end of March as compared with January.

Draftsmen

Improved economic conditions, particularly an acceleration in construction activity resulted in increased demand for draftsmen in many of the 30 major labor market areas. Twenty of these areas reported significant declines in the number of applicants in this occupation between January and March 1959. The following quotation from the New York area is indicative of the trend:

> "Although there has been no mass hiring of engineers and draftsmen for highway projects, experienced designers in this field find it easier to obtain employment now than last year. Opportunities for architectural designers and draftsmen, as evidenced by Employment Service orders, more than tripled in the February-March period. The increase was particularly noticeable in positions for persons with experience in designing and drafting of commercial and institutional structures, multi-story apartment houses and interiors of banks and stores. During the latter part of 1958 and at the beginning of the current year few firms were in the market for architectural designers and draftsmen regardless of the men's experience."

In San Francisco the information provided on draftsmen was considered to be the best "indicator" of the supply-demand relationship for all of the selected occupations included in this report. The surplus of applicants declined in that area between January and March and "...most qualified draftsmen found jobs. Those with architectural, piping and electrical design experience virtually disappeared from the surplus group. ...Efforts to place some of the lesser qualified draftsmen in the improving labor market were not fruitful in March."

In Portland the seasonal demand for draftsmen also had depleted the local supply and the number of applicants dwindled between January and March. Requirements for architectural draftsmen expanded because of the demand from contractors working on plans for the Centennial Exposition Center, as well as for residential construction and other projects.

Other reasons for improved demand for draftsmen included increases in the production of instruments and related products, and an expansion in research and engineering services in the Paterson area, and similar increases in the staffing needs of private engineering companies in Detroit. Accelerated production in durable goods in Milwaukee resulted in a drop in the number of draftsmen seeking employment and an increase in new openings between January and March.

While the total number of job applicants in the 30 major labor market areas declined by 877 to a total of 5,877 in March, seven of the areas reported significant increases in the number of draftsmen seeking employment. These areas were: Boston, Newark, Philadelphia, Washington, D. C., Atlanta, New Orleans, St. Louis, and Kansas City. In several of these areas, however, the increases were quite small.

The number of openings placed in interarea clearance by local employment offices in the 30 major areas showed a decline from 171 such openings reported in January to 104 in March. The drop in clearance openings in the Boston area accounted for nearly all of the decline. In January Boston had reported more than 100 orders for marine draftsmen placed in interarea clearance as a result of ship construction activity in the development and design of nuclear-powered vessels.

For the nation as a whole, clearance orders for draftsmen were up in March to a total of 391--nearly double the March 1958 total of 204 openings and about 4 percent above the January level of 377 unfilled openings for draftsmen. (see Table II, page 23).

Laboratory Technicians and Assistants

Openings received for laboratory technicians by local offices of the employment service in the 30 major labor market areas declined from 316 to 240 in the period between January and March. Changes in unfilled job orders on hand were small, as were the numbers placed in interarea clearance because they could not be filled locally. Likewise there was only a small decline in the number of active applicants in the 30 major areas totaled 2,897 in January and 2,776 in March.

Two major factors appear to affect the statistical reporting on technicians from local employment service operations. One of these is the large number of entry workers classified in this occupation which is reflected in the large number of active applications in relation to job openings. The other is the persistent shortage of qualified and highly trained medical technicians evident from the reports in many areas although not necessarily recruited through the employment service.

The largest single group of openings placed in interarea clearance because they could not be filled locally was reported by Boston. (Cleveland and Newark also reported a significant number of such openings.) The vacancies in Boston were for specialists in jobs involving various types of electronic equipment, including computers, psychological testing and weather research including the testing and operation of radar equipment. Such positions generally required theoretical training and 3 to 6 years of applicable experience.

An increase in the demand for laboratory technicians in the Paterson area was attributed to an expansion of research and engineering activities, as well as to an increase in the production of instruments and related products. Applications on file for employment from laboratory technicians declined from 63 in January to 44 in March. In Newark, however, applications showed an increase during the same period from a total of 113 in January to 165 in March. Other areas showing an increase in the number of active applicants included Washington, D. C., New Orleans, Kansas City, Indianapolis, Chicago, Denver, Los Angles, and San Francisco-Oakland.

Some areas indicated increases in demand for technicians, particularly for medical technicians. In New York for example--

> "Openings and placements of medical technologists are rising although they remain below the comparable months of 1958. There has been a slight increase in demand from hospitals mainly because of new or expanded research projects. But the problem of matching employer specifications and applicants remains. Openings are predominantly for females while the number of male jobseekers is increasing. In addition, many of the jobseekers do not have the required approved training."

> "The shortage of well trained and fully qualified medical technicians is unlikely to disappear for some time to come as the capacity of the approved schools, which was felt to be inadequate in the past, was not observed to have increased in the past year. There has been a rise in student applications but many of the applicants are from out of the City and are expected to return home after training."

Philadelphia also reported a continuing shortage of medical and scientific laboratory assistants, although the area had 223 applicants in March and no unfilled openings for the occupation were reported to have been placed in interarea clearance. In St. Louis a similar situation existed, with relatively little change in demand and supply evident from the statistics for employment service activities, but with hospitals and health centers in the area reporting a continuing shortage of laboratory technicians. In Denver a consistent demand for registered medical technicians was reported. In the Minneapolis-St. Paul area the demand for technicians increased, while the number of active applications in this occupation declined.

The economic improvement in the San Francisco area was not reflected in the number of registered laboratory technicians. Part of the increase in the number of applicants resulted from the closing of a testing division in a chemical plant. Because of the highly specialized nature of their work they were at a disadvantage in the job market because of the lack of similar employment in the community.

Other West Coast areas reported an adequate supply although in Portland several openings remained unfilled in March because available applicants did not possess the required qualifications.

C. Employment Outlook for Graduates of 1959

One favorable indicator of an improved job market for college graduates in the spring of 1959 compared with 1958 is the relaxation of experience requirements by some employers, thereby making more job opportunities available to recent engineering graduates. During the depth of the 1957 recession when an increased supply of engineering personnel was available, employers emphasized a combination of specific academic training and of employment experience. While there continues to be strong demand for engineers with advanced degrees and for senior engineers whose experience qualifies them to direct a project, some relaxation in hiring specifications has occurred.

Economic trends which contribute to the high level of demand in the specific occupations covered in this report include defense spending for missiles and space projects, as well as government support of research and development projects in other fields; highway and school construction projects; high levels of consumer purchasing which in turn have stimulated business investment in new plants and equipment including a vast amount of data handling equipment; demand for teachers for high schools and colleges resulting from population growth, and the greater emphasis upon scientific and engineering training which has increased the requirements for teaching personnel in science and mathematics at all levels of instruction.

All of these developments have increased demand for both engineering and scientific personnel including supporting technical personnel in such fields as missile development, the design of vacuum tube circuits, the design of transistor circuits, the design of nuclear instrumentation, the design of aircraft and telemetering systems, the design of data transmission and handling systems, the planning and conducting of wind tunnel tests, design of components for aircraft, missile and jet propulsion systems, and for research workers in chemical, biological, and medical fields.

In San Francisco several large research laboratories were expecting to fill out their personnel needs in late March by recruiting June graduates. One of the laboratories was contacting various colleges throughout the country and had already sent out job applications to 100 individuals who would be graduated in June while another local laboratory was conducting an intensive recruitment campaign at the University of California. Recruitment at local colleges in the Pittsburgh area for engineering graduates was reported to have become more energetic with salary offers again at top levels.

In an open letter to college graduates of 1959, Secretary of Labor James P. Mitchell in May[1] pointed out that the economic situation had improved job prospects over one year ago and that demand was especially strong for graduates with advanced degrees. In general, graduates with majors in mechanical, electrical, and aeronautical engineering appear to be in greater demand than those with majors in civil, chemical and industrial engineering. Although the employment situation has improved, employers are continuing to be highly selective in their hiring practices and men graduating near the top of their class will be actively sought.

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[1] U. S. Department of Labor, Press Release, May 18, 1959.

Greater selectivity is also expected to characterize the hiring of chemistry graduates. Those holding advanced degrees, and bachelor's degree holders near the top of their class were being actively sought. Teaching needs in this field are good. Particularly in demand are physics graduates who hold advanced degrees. Research organizations in government, universities and industry are having considerable difficulty in satisfying their requirements for physicists and this demand is expected to grow. The employment outlook for graduates with a major in mathematics is very good at all levels of training, and excellent for graduates with the Ph.D degree. Persons qualified to teach mathematics at the college level, and mathematics graduates qualified to work on physics and engineering problems are in special demand. New graduates with broad training in mathematics and statistics and a knowledge of engineering or the physical sciences are in demand for many types of work including operations research, quality control and to prepare problems for solution by electronic computing equipment.

Graduates in geology at the bachelor's degree level will have competition for professional jobs, while those with advanced training particularly at the Ph.D degree level are in much greater demand. Meteorologists are needed for government positions in weather forecasting and to staff expanded programs of hurricane research, air pollution research, storm warning and flood forecasting. Private industry is also expected to provide some employment opportunities, and the new space programs are expected to broaden the applications of meteorological science.

Graduates in the biological sciences, particularly candidates for the doctoral degree in fields such as microbiology, physiology, and pharmacology are in demand, while those at the bachelor's level are more likely to be employed in related specialties as junior professional assistants in research laboratories. Growth expenditures for basic and applied biological research in the fields of medicine and agriculture is likely to be a major factor in the increased demand for biological scientists, with industry and government both providing increased employment opportunities and with greater demand for trained teachers as college enrollments increase.

One survey of anticipated demand for graduates in 1959 was conducted by Frank S. Endicott of Northwestern University in December 1958.1/ The thirteenth annual survey in this series covered employment trends based on reports from 205 representative companies including engineering graduates as well as graduates in other fields. These companies reported that they planned to hire 13 percent more graduating seniors in engineering, physics and chemistry than they had hired from the class of 1958. The upward trend was reported by companies of different sizes, and by companies seeking both small and large numbers of graduates. In about one-half of the companies the need was fairly stable, and new graduates were being hired for normal replacement needs. In 85 of the companies, expansion and growth were expected to result in demand for an increased number of graduates. Demand for engineering graduates in 1959 was expected to be strong.

1/ Endicott, Frank S. The Thirteenth Annual Endicott Report; The prognosis for the 1959 recruiting season. Journal of College Placement, Vol. XIX, No. 3, March 1959, p. 42.

A more recent survey of anticipated labor market trends for new graduates was conducted by the Wall Street Journal and reported in May 1959.1/ Only about two dozen industrial concerns were covered in this survey, but a group of about 75 placement officials were included. It was concluded that even though a larger number of jobs would be filled in 1959 hiring would be more selective than in 1958, with graduates in the latter half of their classes unable to obtain employment until late fall, and then, probably at starting salaries below those offered by recruiters on their spring visits to the college campuses. Recruiters believe that they have refined their interviewing techniques and are seeking men fitted to specific jobs more than in past years. Salary scales are expected to average about 3 to 5 percent above 1958.

> "The supply and demand picture, of course, varies widely among different industries. Not surprisingly, the strongest demand is coming from companies specializing in electronics and missiles, according to placement men. Insurance firms and retailers also are accelerating their recruiting. But the hiring pace is slower for petroleum, textiles and transportation companies, and the chemical and drug industries are not taking on nearly as many new men as college officials had anticipated earlier. Strong demand for certain types of engineers is continuing, much as in former years, placement officials report, even though the nearly 40,000 men receiving such degrees this year are almost 5,000 or 13%, more than in 1958."

The same article, quoting an official of one of the nation's largest technical schools, said there is presently very real competition for the electrical engineers and the more able metallurgical engineers, but more room for selectivity among civils, chemicals and industrials, with mechanicals and aeronauticals falling in between. The article added that engineers, while accounting for only a little more than 10 percent of the graduates, have a relatively more attractive job outlook. Only graduates in a few other classifications such as accounting, library science, and few other specialties are as eagerly sought by employers.

The increased selectivity of recruitment in 1959 graduates is shown in other ways. Some companies which have increased their hiring quotas are reporting that they are contacting graduates in a smaller number of colleges. Another evidence of greater selectivity is the extent to which multiple job offers go to a relatively small number of men at the top of their class with many companies refusing to interview graduates who are not in the top 25 percent of their class. Some companies are reported to have abandoned the practice of visiting college campuses to recruit graduates, thereby cutting competition between companies. The survey indicates the trend toward more intensive recruitment in that recruiters are conducting interviews with larger numbers of graduates in order to fill vacancies. For example, one mid-western manufacturing firm which produces professional and scientific instruments is reported to be interviewing about 3,000 graduates in

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1/ Wall Street Journal, May 18, 1959, p. 1 & 11.

anticipation of hiring 200.

In an account based on a survey of the nation's teacher supply made by the National Education Association it was estimated that the class of 1959 would produce about 7,000 new science teachers, an increase of about 28 percent over 1958.1/ The number of new mathematics teachers was estimated to be 4,700, an increase of 37 percent over 1958, although a larger number of teachers for high school and elementary teaching were expected to be graduated in 1959, it was anticipated on the basis of past experience that only about 73 percent of them would take teaching jobs. This included teachers in all fields of specialization.

1/ New York Times, April 28, 1959, p. 32.

III. Appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Bureau of Employment Security, Office of Program Review and Analysis. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is an Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

A summary of information on clearance openings in all States has been utilized in the preparation of the bimonthly reports entitled Local Shortages in Selected Scientific and Engineering Occupations prepared at the request of the National Science Foundation.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas 1/ for the first time in May 1958. These area labor market reports provide bimonthly information on local economic factors contributing to changing demand-supply relationships for engineering, scientific and technical personnel in the area. Insofar as possible other sources of information are utilized including occupational information from labor market areas.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. Some are unemployed with good experience and work history; others may be now employed but seeking new jobs; still others may be seeking supplementary jobs on a part-time basis; a few are not now available but desire to be interviewed for future work; some have degrees but no recent experience, or if they have the experience, lack the usual college degree or required membership in professional associations; others are non-citizens in a labor market where a large volume of the openings are at defense-related establishments; and finally,

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1/ The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), Engineers, chemical (0-15), Engineers, civil (0-16), Engineers, industrial (0-18), Engineers, mechanical (0-19), Engineers, aeronautical (0-19.03), Engineers, mining (0-20), Chemists (0-07), Natural Scientists, n.e.c. (0-35), Draftsmen (0-48), and Laboratory Technicians and Assistants (0-50). A list of the 30 areas appears on page 20.

there are those individuals with excellent backgrounds whose salary expectations are out of line with rates commonly being paid in the area.

The number of actual openings available at local offices may be appreciably lower than the total requirements for these reasons: an order being carried as open for one when several workers may in fact be required; job orders are developed as suitable applicants appear; many firms do not file formal orders but wish to be notified if suitable applicants become available; and finally, when occupations are in short supply, the number of openings understates the total demand and may even decline because employers, thinking there's no use, may not place job orders.

List of 30 Major Labor Market Areas

Boston, Massachusetts
Providence, Rhode Island
Buffalo, New York
New York, New York
Paterson-Clifton-Passaic, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Baltimore, Maryland
Washington, D. C.
Louisville, Kentucky
Atlanta, Georgia
New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas
St. Louis, Missouri
Kansas City, Missouri-Kansas
Indianapolis, Indiana
Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Detroit, Michigan
Chicago-Calumet, Illinois-Indiana
Milwaukee-Waukesha, Wisconsin
Minneapolis-St. Paul, Minnesota
Denver, Colorado
Los Angeles-Long Beach, California
San Francisco-Oakland, California
Portland, Oregon
Seattle, Washington

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-May 1959

Month and Year	All Occupations	Professional and Managerial	Selected Occupations			
			Total	Engineers	Scientists	Draftsmen & Technicians
Jan. 1956	27,887	12,845	6,844	4,792	476	1,576
Jan. 1957	35,629	14,498	9,327	6,349	723	2,255
March	34,390	15,952	9,330	6,428	762	2,140
May	31,452	14,007	8,434	5,976	606	1,852
July	29,144	11,879	7,467	5,437	650	1,380
Sept.	23,208	8,986	5,506	3,946	595	965
Nov.	13,859	5,388	2,908	1,993	323	592
Jan. 1958	14,665	7,726	2,634	1,817	297	520
March	14,451	8,244	3,563	2,717	465	381
May	15,552	9,439	3,572	2,764	397	411
July	14,420	7,514	3,584	2,921	277	386
Sept.	15,363	8,732	5,498	4,447	626	425
Nov.	17,661	9,308	4,924	3,906	610	408
Jan. 1959	16,042	10,530	5,423	4,312	579	532
March R/	17,960	10,820	5,654	4,278	757	619
May P/	23,232	12,828	5,767	4,320	802	645

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

R/ Revised
P/ Preliminary

Table II. Clearance Openings in Selected Occupations
March 1959, January 1959, and March 1958

Occupation	March 1959	Jan. 1959	March 1958	Percent change to March 1959 from: January 1959	March 1958	Percentage Distribution March 1959
All selected occupations	5,654	5,545	3,563	+2.0	+58.7	100.0
Professional						
Engineers, total	4,278	4,386	2,717	-2.5	+57.5	75.7
Metallurgical	40	35	46	a/	a/	.7
Chemical	103	87	122	+18.4	-15.6	1.8
Civil	397	676	836	-41.3	-41.3	7.0
Electrical	1,891	1,746	924	+8.3	+104.7	33.4
Industrial	211	179	162	+17.9	+30.2	3.7
Mechanical (except aero.)	932	937	445	+38.6	+191.9	23.0
Aeronautical	701	722	179	-53.7	+86.6	5.9
Mining	3	4	3	a/	a/	a/
Other Professional	757	608	465	+24.5	+62.8	13.4
Physicists	184	177	105	+4.0	+75.2	3.3
Mathematicians	170	161	80	+5.6	+112.5	3.0
Chemists	115	89	156	+29.2	-26.3	2.0
Life Scientists	83	30	41	+176.7	+102.4	1.5
Writers, tech. pubs.	181	119	67	+52.1	+170.1	3.2
Physical Scientists	23	26	7	a/	a/	a/
Statisticians	1	6	9	a/	a/	a/
Semiprofessional						
Draftsmen, total	391	377	204	+3.7	+91.7	6.9
Mechanical	176	120	70	+46.7	+151.4	3.1
Other	215	257	134	-16.3	+60.4	3.8
Laboratory Technicians and assistants, total	228	174	177	+31.0	+28.8	4.0
Medical technicians	181	149	121	+21.5	+49.6	3.2

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a/ Percent change not shown where both absolutes are less than 50.

Source: Department of Labor, Bureau of Employment Security, Office of Program Reveiw and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations*
March and January 1959

Labor Market Area	Engineers		Chemists		Natural Scientists		Draftsmen		Laboratory Technicians	
	March	Jan. '59R/	March	Jan. '59R/	March	Jan. '59R/	March	Jan. '59R/	March	Jan. '59R/
Total	5,895	6,397	785	858	613	606	5,877	6,754	2,776	2,897
Boston	258	209	43	38	13	6	172	154	91	188
Providence	80	61	12	19	3	2	43	45	30	34
Buffalo	155	138	28	21	12	8	97	105	85	86
New York	926	1,216	194	254	130	136	1,141	1,317	359	366
Paterson	120	146	19	32	4	7	74	92	44	63
Newark	260	296	66	59	21	22	185	173	165	113
Philadelphia	473	447	32	30	31	20	515	508	223	219
Pittsburgh	299	349	46	38	24	24	586	609	318	377
Baltimore	65	65	9	13	6	3	69	67	39	41
Washington, D. C.	149	95	20	17	51	31	78	71	66	58
Louisville	17	29	3	1	2	1	16	33	23	31
Atlanta	62	55	4	2	4	3	43	28	27	29
New Orleans	73	67	16	13	18	15	61	44	38	31
Houston	153	155	16	20	29	46	123	193	54	69
Dallas	197	188	8	5	28	19	106	150	37	32
St. Louis	76	56	9	10	12	9	79	69	59	64
Kansas City	28	19	8	2	6	3	32	17	35	12
Indianapolis	23	27	4	4	1	1	17	25	29	22
Cincinnati	50	47	6	2	2	8	38	54	21	53
Columbus (Ohio)	25	28	5	3	3	3	18	25	17	13
Cleveland	217	278	12	19	9	9	262	329	67	88
Detroit	395	585	24	22	6	7	631	814	160	156
Chicago	267	274	55	55	23	14	214	335	113	101
Milwaukee	138	143	18	24	21	28	53	88	31	47
Minneapolis-St. Paul	146	142	15	11	15	23	132	158	42	50
Denver	61	102	9	11	30	22	21	33	37	29
Los Angeles-Long Beach	827	814	61	66	72	83	751	852	344	327
San Francisco-Oakland	254	270	33	45	21	38	264	284	172	154
Portland (Ore.)	63	62	8	11	7	12	23	42	38	42
Seattle	38	34	2	11	9	3	53	40	12	20

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occupations covered, see Footnote 1, p. 18.

R/ Revised.

Openings on hand at the End of March and January 1959 at Public
Employment Offices in 30 Major Labor Market Areas
Selected Occupations*

Labor Market Area	Engineers		Chemists		Natural Scientists		Draftsmen		Laboratory Technicians	
	March	Jan.'59	March	Jan.'59	March	Jan.'59	March	Jan.'59	March	Jan.'59
Total	3,553	3,932	160	122	447	419	550	612	411	391
Boston	187	264	7	8	51	27	70	155	65	53
Providence	6	4	1	0	1	0	6	1	2	3
Buffalo	86	147	7	5	31	47	8	5	18	10
New York	56	45	26	30	12	10	38	24	68	69
Paterson-Clifton-Passaic	42	51	0	2	3	2	6	15	3	2
Newark-Jersey City	45	40	7	3	1	1	9	77	6	7
Philadelphia	160	129	0	0	0	0	9	11	8	17
Pittsburgh	20	11	4	3	3	3	3	5	10	5
Baltimore	109	112	0	1	2	2	10	10	3	3
Washington, D. C.	108	379	1	0	21	18	4	16	17	34
Louisville	11	3	1	1	0	0	2	2	0	0
Atlanta	5	8	0	0	1	0	9	12	8	8
New Orleans	21	23	0	0	0	0	1	4	1	0
Houston-Baytown	13	10	0	0	0	1	5	4	1	3
Dallas	51	65	2	1	4	1	10	16	1	1
St. Louis	26	22	2	0	1	0	22	1	12	11
Kansas City	22	24	2	2	0	1	6	5	7	3
Indianapolis	27	24	2	3	2	1	6	2	1	3
Cincinnati	194	202	4	0	5	2	5	5	4	5
Columbus	28	26	1	1	2	1	8	5	5	5
Cleveland	42	33	8	9	1	1	10	7	13	10
Detroit	27	34	2	1	0	0	6	18	5	4
Chicago-Calumet	115	96	13	8	11	13	21	42	27	26
Milwaukee-Waukesha	163	151	5	6	10	14	44	32	19	15
Minneapolis-St. Paul	107	123	20	9	10	13	53	34	27	14
Denver	49	54	1	0	3	1	6	3	17	8
Los Angeles-Long Beach	769	787	35	28	43	30	132	76	43	34
San Francisco-Oakland	59	55	9	1	3	3	20	17	16	28
Portland	7	15	0	0	0	0	12	4	3	4
Seattle	998	995	0	0	226	227	4	4	1	6

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* For a list of occupations covered see Footnote 1, page 18.

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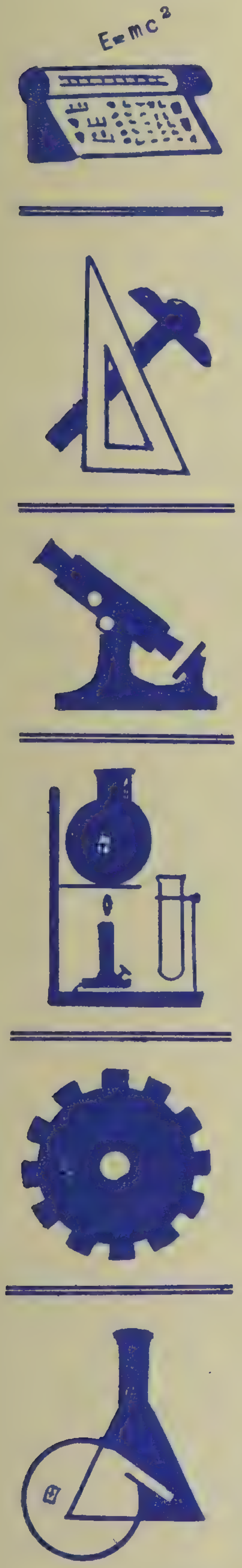

CURRENT
LABOR MARKET CONDITIONS
in
ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

July 1959

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director

Washington 25, D. C.

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Office of Program Review and Analysis
Louis Levine, Assistant Director, Bureau of Employment Security

This is the seventh in a series of bimonthly reports prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It is based on field reports on current conditions in 30 major labor market areas, statistics on job openings for selected engineering, scientific and technical occupations placed in interarea clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources.

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Trend Indicators

EMPLOYERS RELAX HIRING SPECIFICATIONS IN SHORTAGE SITUATIONS.

Immigrants: Employers are increasingly amenable to relaxing non-performance specifications if the applicant can do the job. In San Francisco-Oakland, one office recently placed a young Swedish mechanical engineer with a limited English vocabulary on a $675 per month job the second day after he registered. A 53 year old architectural draftsman from Western Germany, who knew but a few English words, was readily hired through the same office because of his impressive experience as a detailer. One year ago, this same local office stated that immigrants were one of the more prominent groups of persons who could not be placed on jobs.... St. Louis reports that hospitals are making use of help offered by refugees and students from foreign countries.

Working hours: In an effort to recruit vitally needed medical technicians, some Boston hospitals are advertising that "on call" provisions have been eliminated in favor of a straight 40-hour week.

Job dilution: The field in which perhaps the most extensive job dilution is being practiced, according to a Boston report, is in the electronics technician category. The less complicated layout, fabrication, and wiring problems are being performed, under direct supervision by unskilled and semi-skilled workers.

OTHER TRENDS IN THE MAKING: A factor which complicates recruitment is the increasing number of dual-occupation jobs--such as engineer-psychologist, health-physicist, and electronics engineer-patent attorney. . . occupational shortages are frequently of the pinpoint variety. Employers, for example, want experimental nuclear physicists with experience on particle accelerators, electronic technicians for physiological experiments in the field of audio, physicists to work in solid state analysis, and documentation engineers with library and computer background. . . More and more firms are branching out into design and development fields to supplement their usual manufacturing function. . . Round-robin recruitment: Huge display advertisements in the Boston Sunday newspapers, inserted by non-area employers, continue to be a feature of that area's labor market situation. Advertising by Boston organizations in the Sunday New York Times has reached extremely high proportions.

UNIVERSITY RECRUITMENT: The employment market for this June's graduates is characterized as a promising one with opportunities exceeding those of 1957-1958. . . A major oil company interviewed graduating seniors in engineering, chemistry, and physics at 65 colleges. The company indicated it was not getting enough recruits to meet its needs. Starting salaries were raised by 5 percent from one year ago.... A large food processing concern visited seven colleges in California and Washington but found difficulty in recruiting engineers. Company officials commented that these starting salaries could not compete with those offered by defense-related plants.... June graduates in the School of Engineering at Tulane University totaled 79, distributed as follows: Chemical Engineers, 12; Civil Engineers, 19; Electrical Engineers, 20; Mechanical Engineers, 27. Authorities of the school state that about 20 percent of the graduates will join the Armed Forces; four are planning to enter the graduate school; and all but four of the others have found employment, but mainly outside the local area.... Nine Medical Technicians graduated from Loyola University have all been hired in local hospitals and clinics.... Both Carnegie Institute of Technology and the University of Pittsburgh report that over 90 percent of their engineering graduates have commitments. Salary offers are averaging about $550 a month.

THE NATION'S MAJOR EMPLOYMENT CENTERS present sharply varying demand-supply situations despite the overall shortage of engineering, scientific, and technical personnel.... From Cleveland: Manpower problems are slight just now (May). Hiring specifications have become stricter during the past year, with employers demanding more specialized experience, longer periods of experience in the particular engineering field, and usually preferring some post-graduate training. Age restrictions seem to exist to a greater degree than formerly. It is felt that the salaries offered have not kept pace with the more severe requirements.... From Boston, on the other hand: Critical evaluation of the relationship between the supply of engineers and other selected specialists and the demand for such individuals points to a continuing severe stringency in the supply.... Buffalo: Aeronautical engineers were in more than adequate supply in May.... Seattle: Aeronautical engineers were very rare and difficult to come by.

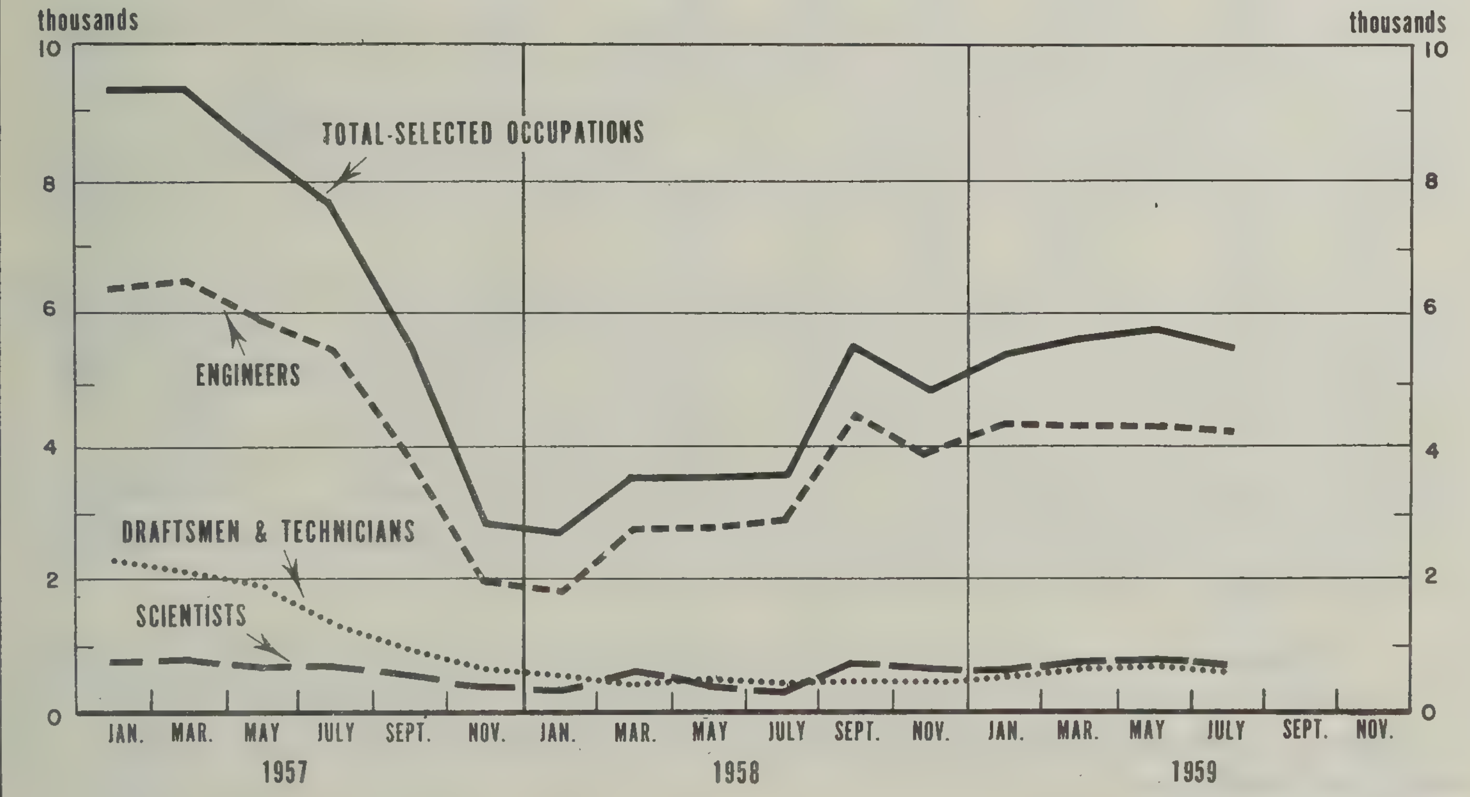
LOCAL SURPLUSES OF NATIONALLY SCARCE MANPOWER: Several consulting engineering firms in San Francisco-Oakland engaged in the school building program have reported small layoffs of structural engineers. Meanwhile, the Structural Engineers Association has no openings nor have other structural engineering firms offered any encouragement to the job seekers.... A sizable increase in work applications among geologists in New Orleans resulted from the slack in offshore oil exploration activities.... Boston reports that a definite increase in the local supply of mechanical, electrical, and civil engineers and draftsmen may be expected upon completion of the St. Lawrence Seaway project.... In Buffalo, virtually all engineering groups other than electrical, as well as chemists were in surplus supply in May. Surpluses of draftsmen and technicians also continued in this area.

recent developments in INTERAREA RECRUITMENT

The trend of job openings in selected engineering, scientific, and technical occupations placed in interarea clearance during June and July paused in its almost uninterrupted climb since the beginning of 1958. Unfilled openings in clearance in this group of occupations numbered 5,500 in July, a drop of 6 percent from the two-month earlier level. They were, nevertheless, still more numerous than in any month in 1958 although substantially less than the highs of approximately 9,000 in the early part of 1957.

Engineering vacancies, which accounted for three-fourths of the openings listed for all selected classifications, declined by about 200 between May and July. All engineering groups except electrical participated in the decline, with the major reductions, percentagewise, occurring in the industrial and mechanical subgroups.

TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957-1959



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

In contrast to this decline, new brisk demand for electrical engineers intensified the already existing shortage. Their listings numbered some 2,000 in July, up almost 100 in two months and double the number of openings in the same month a year ago. The recent rise was due in large measure to recruitment efforts in behalf of a Milwaukee, Wisconsin firm which had received substantial contracts for research and production of missile guidance systems. The growing importance of demand for electrical engineers is evidenced by the proportion that this group represented among all engineering vacancies in clearance by public employment offices:

Electrical Engineers

Month	Percent of total engineering openings
July 1959	48
May 1959	44
March 1959	45
Jan. 1959	40
July 1958	34
March 1958	34

Another rapidly growing recruitment area has been the demand for aeronautical engineers, also arising largely out of the missile program. Although the number of openings in this category has declined recently, their proportion of total engineering openings increased to 18 percent in July 1959 from only 9 percent in July 1958.

Relatively sharp declines in job openings between May and July were also posted for selected scientific occupations. Normally, the demand for physicists and mathematicians is closely associated with that for engineers in missile work and space technology. Although Wisconsin began recruiting these scientists for missile guidance systems, fewer listings were reported largely because of the withdrawal of clearance openings in the State of Washington when appropriations for the Bomarc missile were cut.

Despite the short-run fluctuations in openings for scientific occupations, shortages since a year ago have intensified sharply. The number of job openings for physicists, mathematicians and chemists has more or less doubled while that for technical writers has multiplied fourfold.

Opportunities for draftsmen rose sharply in June to 600 from 400 in May and then dropped off somewhat in July. The approximately 500 openings in July were almost two and a half times greater than in July a year ago. Chiefly responsible for the increased demand in recent months were requirements for mechanical and auto body draftsmen in Detroit, for detail and electrical draftsmen for the communications industry in Wisconsin, and for aeronautical draftsmen in New Jersey.

Number of Nonagricultural Job Openings in Selected Occupations in Interarea Clearance at Public Employment Offices, U.S. Total, July 1959, May 1959, and July 1958

Selected Occupations	Job Openings			Change to July 1959 from: May 1959		July 1958	
	July P/ 1959	May R/ 1959	July 1958	Number	Percent	Number	Percent
All Selected Occupations	5,522	5,860	3,584	-338	-5.8	+1,938	+54.1
Engineers, Total	4,150	4,387	2,921	-237	-5.4	+1,229	+42.1
Chemical	87	97	46	-10	-10.3	+41	+89.1
Civil	332	364	792	-32	-8.8	-460	-58.1
Electrical	2,007	1,910	987	+97	+5.1	+1,020	+103.3
Industrial	149	231	138	-82	-35.5	+11	+8.0
Mechanical 1/	774	909	648	-135	-14.9	+126	+19.4
Aeronautical	747	818	271	-71	-8.7	+476	+175.6
Selected Scientific Occupations	671	827	277	-156	-18.9	+394	+142.2
Physicist	141	200	59	-59	-29.5	+82	+139.0
Mathematician	150	196	70	-46	-23.5	+80	+114.3
Chemist	118	89	62	+29	+32.6	+56	+90.3
Technical writer	209	225	44	-16	-7.1	+165	+375.0
Other 2/	53	117	42	-64	-54.7	+11	+26.2
Draftsman	496	402	212	+94	+23.4	+284	+134.0
Laboratory technician	205		174	-39	-16.0	+31	+17.8

1/ Mechanical, except aeronautical
2/ Includes other natural scientists, n.e.c.

P/ Preliminary
R/ Revised

CURRENT TRENDS IN LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

The dominant theme in the labor market for engineers, scientists and technical personnel as the first half of 1959 drew to a close was one of improving job opportunities and a diminishing supply of available workers. Improvement was widespread geographically and in virtually all of the technical categories covered by the 30-area bimonthly survey.

The higher level of economic activity, with its consequent demand for specialized personnel, was clearly reflected in employment service indicators. Active job applications for these workers at public employment offices in the 30 areas declined by almost a fifth between March and May. Job openings increased relatively, by a slightly larger amount. The hard-to-fill jobs, those placed in interarea clearance, also rose substantially.

Two other factors contributed to increased demand. The first appeared to be a continuing expansion in research and development work. More and more manufacturing establishments were turning to this function to supplement customary production activities. The other factor which led to increased demand was seasonal in nature. Food processing plants, notably in canning, raised their requirements for laboratory technicians.

The sharply improving demand for engineers and scientists during April and May was not fully translated into a corresponding decline in the supply of these workers. Chiefly responsible for this relative lack of response was the influx into the labor market of large numbers of college graduates and teachers looking for summer work. Nevertheless, campus recruitment was more vigorous than last year and salary scales were somewhat higher.

The most active demand for engineers occurred in the electronics and aeronautical categories. Among the natural scientists, the largest requirements were for physicists and mathematicians. Laboratory technicians, particularly those in the medical field, were in stringent supply. Chemists and draftsmen, on the other hand, with the exception of a few specialized types, were available in ample numbers and, according to a fair number of reports, in actual oversupply.

ENGINEERS

The supply of engineers, as indicated by the number of active registrations in 30 reporting major labor market areas, dropped substantially from March to May 1959. Over 1,000, or 17 percent, fewer engineers sought jobs at the public employment offices in the 30 areas. The decline was widespread--geographically and among all engineering groups. It extended to 26 reporting areas and to all classifications of engineers except metallurgical and mining. The latter two groups, however, are not very significant, representing only 4 percent of the supply in May 1959.

Improved business conditions were a major factor in the dwindling supply of engineers in at least a third of the reporting areas. Other causes mentioned were seasonality, migration from the area, and increased demand for research and development in the fields of electronics, communications, and missiles. Additional opportunities were also created by some firms who were branching out into design and development fields along with their usual manufacturing function.

Another factor which loomed quite large in the supply-demand relationship was new entrants--the recent graduates--into the labor market. Unlike previous periods, fewer recent graduates registered at public employment offices as firms conducted vigorous campus recruitment drives. In the San Francisco-Oakland area, for example, defense-connected activities in aircraft, missiles, and electronics absorbed the bulk of the graduates. Thus, the University of California placement center estimated that defense spending accounted for 75 percent of the job offers at the bachelor's level up to May.

Demand for engineers at the national level, as indicated by the number of vacancies placed in interarea clearance, increased slightly between March and May 1959. These shortages have been mounting all through 1958, except for November and up to the current period (table I). The May listings of 5,860 openings indicate a sharp recovery from a year earlier but were well below the 8,450 listings reported for May 1957. The bimonthly gain was concentrated largely in openings for aeronautical engineers (table II), for missiles and space research in California.

The number of unfilled engineer openings placed in interarea clearance in the 30 labor market areas indicated a sharper increase in demand and different occupational changes than for the Nation as a whole. The rise in the 30 areas was 17 percent versus 3 percent for the entire country. In the 30 areas, the trend for aeronautical engineers was

Number of Graduates in Technical Fields
and Median Monthly Salary Accepted--
University of California at Berkeley

	Number of Graduates		Median Salary Accepted	
	June 1959	June 1958	June 1959	June 1958
Civil engineering	65	76	$ 500	$ 481
Electrical Engineering	125	154	550	500
Industrial Engineering	25	23	500	470
Mechanical Engineering	125	99	515	490
Mineral Technology	25	21	500	475
Chemistry & Biochem.	33	14	450	390
Chem. & Process Engineer.	38	24	490	465
Mathematics & Statistics	9	9	490	450
Physics	51	17	520	500

SALARY INFORMATION

Source, table above: Preliminary salary survey June 1959 by Student and Alumni Placement Center, U. of California, Berkeley

Source, table at right: "Higher Education Planning and Management Data, 1958-59", U. S. Office of Education.

Engineering Faculty
Median Salaries 1958-59
(Based on 9-10 month basis)

Deans	$13,300
Professors	9,700
Asso. Prof.	7,400
Asst. Prof.	6,230
Instructors	4,890

down as contrasted with advances nationally; this was due to a very large increase in vacancies in San Jose, California in May, not shown in the 30 area total. Also, the rise in clearance openings for all engineers in the 30 areas was mostly among those in the electronics group, due in large measure to recruitment for a Milwaukee firm which had received substantial contracts for research and production of missile guidance systems.

Demand for engineers in the 30 reporting labor market areas is also reflected in openings received and unfilled openings. While these openings are not complete measures of demand since they cover only job orders placed with public employment offices, they do provide an indication of the demand trend and its nature. Both new openings and unfilled openings were higher in May than in March in the 30 areas. Electrical engineers accounted in large part for the rise in both indicators. However, the rise in these two indicators was not as geographically widespread as indicated by the declining supply of job applicants. Many areas indicated that demand had remained stable from March to May. Eleven areas reported increases in new openings but 6 had losses. The largest numerical gain was in Milwaukee which had 188 more openings in May than in March, followed by Dallas, with 53 more openings over this same period. The Los Angeles-Long Beach area reported the largest decline in new openings but noted that this development was not predicated on any easing of demand for engineers. It observed that "the great, unfilled need continued to be for engineers with degrees from accredited colleges, and with highly specialized experience, particularly in mechanical, aeronautical, and electronics research and development."

Area Trends

Area Trends for Engineers
Number of Active Applicants and Unfilled Openings at End of Month
by Public Employment Offices in 30 Major Labor Market Areas, May 1959

Region and Area	Applicants			Openings Unfilled At End of:			Comments
	May 1959	March 1959	May 1958	May 1959	March 1959	May 1958	
New England Region:							
Boston, Mass.	235	258	245	123	187	46	Serious shortage of electrical engineers and shortage or slight shortage of metallurgical, industrial, and aeronautical engineers. A fair supply or balance of chemical, civil, and mechanical engineers.
Providence, R.I.	61	80	INA	11	6	INA	
Middle Atlantic Region:							
Buffalo, N.Y.	228	155	INA	95	86	INA	Shortage of electrical engineers urgent. Other types of engineers in more than adequate supply.
New York, N.Y.	778	924	950	70	56	INA	Surplus of civil and mechanical engineers but shortage of electrical engineers.
Paterson-Clifton-Passaic, N.J.	108	120	INA	83	42	INA	Demand for electrical engineers has more than doubled from March to May.

Area Trends for Engineers

Number of Active Applicants and Unfilled Openings at End of Month by Public Employment Offices in 30 Major Labor Market Areas, May 1959

Region and Area	Applicants			Openings Unfilled At End of:			Comments
	May 1959	March 1959	May 1958	May 1959	March 1959	May 1958	
Middle Atlantic Region: Cont.							
Newark-Jersey City, N.J.	175	260	507	44	45	50	Electrical engineers continue in high demand.
Philadelphia, Pa.	449	473	INA	161	160	INA	Outstanding shortage occupations are those involved in the electronics field.
Pittsburgh, Pa.	273	299	280	43	20	16	No significant change.
East N. Central Region:							
Cincinnati, Ohio	40	50	5	214	194	229	Electrical and mechanical engineers are in greatest demand but there are many positions for industrial, chemical, civil, and architectural. Many of these openings are with firms engaged in research and development in aircraft propulsion, electronic computers and military systems, and atomic applications.

Area Trends for Engineers

Number of Active Applicants and Unfilled Openings at End of Month by Public Employment Offices in 30 Major Labor Market Areas, May 1959

Region and Area	Applicants			Openings Unfilled At End of:			Comments
	May 1959	March 1959	May 1958	May 1959	March 1959	May 1958	
East N. Central Region: Cont.							
Columbus, Ohio	23	25	48	16	28	18	Job opportunities in research and engineering departments have been enhanced by completion and staffing of a new electrical machinery plant and by economic recovery.
Cleveland, Ohio	140	217	429	53	42	23	Generally improved business conditions are indicated in the decline of active applications during the past two months, with some applicants reporting that they were called back to their former jobs.
Indianapolis, Ind.	14	23	52	21	27	7	Upturn in local employment, recruiting by out-of-area firms, and fewer college graduates leaving campuses without jobs have contributed to the reduction in supply.
Chicago-Calumet, Ill.-Ind.	212	267	440	155	115	51	Improved business conditions.
Detroit, Mich.	292	395	711	33	27	INA	Improved labor market conditions in the Detroit area account for a large part of the reduction in the no. of applications.

Area Trends for Engineers

Number of Active Applicants and Unfilled Openings at End of Month
by Public Employment Offices in 30 Major Labor Market Areas, May 1959

Region and Area	Applicants			Openings Unfilled At End of:			Comments
	May 1959	March 1959	May 1958	May 1959	March 1959	May 1958	
East N. Central Region: Cont.							
Milwaukee-Waukesha, Wis.	110	138	146	341	163	117	The awarding of a contract for research and production of missile guidance systems stimulates recruitment of engineers, particularly electronics engineers.
West N. Central Region:							
Minneapolis-St. Paul, Minn.	104	146	106	102	106	64	Civil, electrical and mechanical engineers had sharpest drop in registrations.
St. Louis, Mo.	61	76	43	67	26	20	Increase in demand due to construction activity, acceleration in the missile program, and government recruitment.
Kansas City, Mo.-Kansas	19	28	INA	22	22		

Area Trends for Engineers
Number of Active Applicants and Unfilled Openings at End of Month
by Public Employment Offices in 30 Major Labor Market Areas, May 1959

Region and Area	Applicants			Openings Unfilled At End of:			Comments
	May 1959	March 1959	May 1958	May 1959	March 1959	May 1958	
South Atlantic Region:							
Baltimore, Md.	58	65	80	108	109	24	No significant change.
Washington, D.C.	111	149	136	82	108	450	A change in the needs of the Bureau of Public Roads resulted in a sharp drop in openings for civil engineers.
Atlanta, Ga.	45	62	53	5	5	4	No significant change.
East S. Central Region:							
Louisville, Ky.	25	17	37	7	11	4	No significant change.
West S. Central Region:							
New Orleans, La.	44	73	25	18	21	5	Drop in applications due mainly to applicants failing to maintain their registrations or to moving out of the area.
Houston-Baytown, Texas	95	153	INA	8	13	INA	Both the number of openings for engineers and the supply of engineering applicants have dropped sharply during the past 60 days. Many of the engineers have moved out of the area.

Area Trends for Engineers
Number of Active Applicants and Unfilled Openings at End of Month by Public Employment Offices in 30 Major Labor Market Areas, May 1959

Region and Area	Applicants			Openings Unfilled At End of:			Comments
	May 1959	March 1959	May 1958	May 1959	March 1959	May 1958	
West S. Central Region: Cont.							
Dallas, Texas	80	197	INA	60	51	INA	The supply of engineers has declined considerably while number of openings has increased. It is believed that a large part of supply has left the area.
Mountain Region:							
Denver, Colo.	173	65	138	55	62	22	
Pacific Region:							
Seattle, Wash.	41	38	32	899	998	419	Demand for qualified personnel for missile research and planning operations, outer space programs, and jet plane activities far exceeds the local supply.
Portland, Ore.	41	63	INA	9	7	INA	Supply of applicants continued to decline as job opportunities picked up seasonally.
Los Angeles-Long Beach, Calif.	646	827	INA	790	769	INA	The great unfilled need continued to be for engineers with degrees from accredited colleges, and with highly specialized experience particularly in mechanical, aeronautical, and electronics research and development.

Area Trends for Engineers

Number of Active Applicants and Unfilled Openings at End of Month
by Public Employment Offices in 30 Major Labor Market Areas, May 1959

Region and Area	Applicants			Openings Unfilled At End of:			Comments
	May 1959	March 1959	May 1958	May 1959	March 1959	May 1958	
Pacific Region: Cont.							
San Francisco-Oakland, Calif.	212	254	512	54	59	50	The general improvement in the economy since May 1958 brought substantial reductions in job applicants. Vacancies were being withdrawn by some employees who had been successful in direct campus recruitment.

NATURAL SCIENTISTS

The supply of natural scientists, as indicated by applicants at local public employment offices, remained virtually the same between March and May in 30 major labor market areas providing detailed information on these occupations. Even though demand for these workers improved over the two-month period, the relative insensitivity of the active file was due in part to a seasonal registration of recent and prospective graduates as well as teachers seeking summer work.

Indicative of the supply-demand balance in this broad group of occupations is the ratio of active applications to unfilled job openings in public employment offices. At the end of May there were 5 registrants for every 3 unfilled job openings (in contrast, for example, to a 5:1 ratio for chemists).

The trend in unfilled openings of natural scientists in the 30 areas basically hinges on fluctuations in the demand for physicists and mathematicians. A decline in Seattle to only 62 openings from an earlier 226 openings reflected a cutback in the Bomarc missile program. On the other hand an increase of slightly more than 100 unfilled openings in Milwaukee was attributed to the demand for physicists and mathematicians for work on a large military contract awarded to a subsidiary of an automobile manufacturing establishment.

Other significant comments are as follows: Demand for natural scientists in the Washington, D. C. area was generated by openings in Australia as well as by requirements for mathematicians on electronic data processing programs. The shortage in Portland and Seattle was relatively acute. Despite reduced needs at Boeing a brisk demand still existed there for physicists and mathematicians. In Portland, the supply of natural scientists was depleted by requirements for the Forest Service and other Federal needs. In San Francisco, the job seeking efforts of the local registrants are complicated by the fact that many out-of-State scientists are actively seeking work in that area. New Orleans attributes its recent increase in active file registrants partly to geologists who were laid off in slack offshore oil exploration activities.

CHEMISTS

The supply of chemists, except for a few specialized types, appears adequate to demand. Some comments from the 30 reporting areas, in fact, indicate a supply in excess of demand.

Evidence of the loose supply situation in this occupation is supported by the number of active applications and unfilled openings at public employment offices. At the end of May there were 757 active registrations, virtually no change from two months earlier. This was in sharp contrast to the trend for most of the other selected professional, scientific, and technical occupations which showed substantial reductions in active file registrations over the same period.

The number of unfilled openings, which numbered 170, provides another clue to the supply-demand relationship in this occupational group. Although the levels of public employment office registrations and job orders are only indicative of the labor market situation, the ratio of applications to unfilled openings is one of the largest of any of the occupations covered in the survey. The chemical industry is geographically diversified and many plants are located in areas outside of the major metropolitan centers. The relatively low level of openings registered with the employment service, therefore, may in part reflect the distance of the employing units from the supply centers.

Specific indications of the labor market for chemists are revealed in the numerous area comments. Local supply was in excess of demand, according to reports, from Kansas City, Boston, San Francisco and Seattle. The rise in unfilled openings in Chicago reflected stricter hiring specifications which in turn were a phenomenon of a relatively loose labor market. A report from the St. Louis area indicated that jobs for chemists were being taken over by chemical engineers and technicians.

DRAFTSMEN

The supply of draftsmen in May was generally more than adequate to meet requirements. By far the majority of the 30 reporting areas indicated little or no recruitment problems. A supporting indication of the generally ample supply was to be found in a continuation of strict hiring specifications in a few areas. Another was the 4,500 active applications on file with public employment offices in May against a total of only about 800 unfilled openings. Part of the supply of draftsmen reflected new registrations following the end of the school year. A smaller part of the supply reflected special area circumstances like a tapering off in work on the St. Lawrence Seaway or cutbacks in local construction and consulting engineering activities.

Nevertheless, the number of unemployed draftsmen dropped substantially between March and May due to an accelerated pickup in business activity, particularly in the durable goods industries. Draftsmen registrants at public employment offices in the 30 metropolitan centers declined by 1,400, or 24 percent, in the 2-month period while unfilled openings were increasing 12 percent.

Certain types of draftsmen specialists continued in short supply. Portland, for example, indicated a need for architectural draftsmen with backgrounds in commercial buildings and schools; its supply was mostly in men with map-drafting abilities. Seattle and San Francisco also reported active demand for architectural draftsmen.

LABORATORY TECHNICIANS AND ASSISTANTS

The basic manpower situation for laboratory technicians and assistants in the 30 reporting metropolitan areas is one of stringency. The tightness is especially marked among medical technicians.

Part of the recruitment difficulty lies in the hiring specifications which are scaled too high for the caliber of the available supply. In St. Louis, for example, where requirements usually call for a college graduate and a chronic shortage is reported, only 3 of the 26 applicants registered with the employment service had a college degree. For the 30 areas as a whole, only 14 percent of the approximately 2,200 registrants had college degrees.

The difficulty in recruiting medical technicians results in part from the relatively low wages which are offered in relation to defense-connected industries. In those areas where government-financed research laboratories in the field of rocketry and space exploration compete for the supply of chemistry and biology majors at the bachelor's level, hospitals and medical research institutions have a particularly difficult time in recruiting laboratory assistants. In Boston, medical research institutes which felt the shortage most severely have instituted improvements in the scheduling of working hours and have raised salaries somewhat.

The trend in the number of job seekers registered with public employment offices and the number of job openings against those registrations reflects the growing demand for workers in this category. Approximately 2,200 laboratory technicians and assistants were registered at the end of May, a decline of about 550 or 20 percent from March and, on the basis of 22 areas reporting such statistics, a drop of 25 percent from May a year ago. Demand over the March-May period was particularly vigorous in Los Angeles, Detroit, Newark-Jersey City, and Cleveland. Seasonal requirements in the canning industry were partially responsible for the accelerated hiring on the West Coast.

Despite the sharp drop in the number of registrants of laboratory technicians, the number of unfilled openings at local public employment offices in the 30 areas between March and May showed practically no change, indicating the continuing nature of the demand.

DIGEST

of related information

Engineering Enrollment Publication Appears in Early August

The Office of Education is releasing the tenth report in its annual series Engineering Enrollments and Degrees 1958 in the first part of August. The data on engineering enrollments in this series of reports are limited to enrollments in institutions of higher education which confer engineering degrees. Undergraduate students preparing for a career in engineering in other institutions such as liberal arts colleges and junior colleges are not included in the report. Some highlights of the report are as follows:

1. Total engineering enrollment declined for the first time in seven years. The total reported--289,680 students--was 2.5 percent below last year. By contrast, the opening (fall) enrollment of all degree-credit students in institutions of higher education increased 6.2 percent since 1957.

2. Undergraduate enrollment in engineering--256,779--was down 4.5 percent. The drop in freshmen was particularly sharp--11.1 percent. By contrast, total college first-time enrollment was up 7.0 percent.

3. Graduate enrollments in engineering reached new peaks at all levels. Enrollment for the master's degree numbered 28,138; and for the doctors degree, 4,763.

4. The number of degrees awarded in engineering continued to rise at all levels: bachelor's degrees, 13.2 percent; master's degrees, up 10.6 percent; and doctor's degrees, up 8.6 percent.

Engineering and Scientific Manpower Newsletter

Highlights of the June 30 issue of the Engineering and Scientific Manpower Newsletter, prepared jointly by the Scientific Manpower Commission and Engineering Manpower Commission of Engineers Joint Council are as follows:

1. Deans of leading engineering colleges have given the following reasons for the decrease in engineering enrollment in 1958: (a) A false appraisal of the long-range engineering career opportunities by counselors, students, and parents, based on reports in the general press on the layoff and reduction of company engineering complements during

the 1957-58 recession period; (b) increased concern about rigors of the engineering curriculum; and (c) increased interest by potential engineering students in other scientific fields resulting in diversion of students to other educational pursuits.

2. Placement of 1959 engineering graduates proceeded at a greater pace than in 1958. The proportion of 1959 graduates with immediate employment totaled 63 percent as compared with 59 percent in 1958.

3. There is a marked shortage of astronomers in the U. S. at the present time due to space-age demands. Degrees granted in astronomy in 1958 were 25 bachelors, 20 masters, and 22 doctors. Only 16 colleges and universities have separate astronomy departments; hence many of the graduate students have taken their undergraduate work in physics or mathematics. For this reason the number of bachelors is deceptively low.

   Even so, the total number of men and women entering the profession falls far short of the immediate and foreseeable future. All of the Ph. D. graduates, for example, could be used as replacements in colleges and universities without any allowance for expansion. Astronomers are also now being recruited in appreciable numbers by industry, particularly by aircraft companies engaged in the construction of satellites and space probes. Although the demand from industry is greatest for men trained in celestial mechanics, astrophysicists are also being sought.

Demand for Engineers

Of the various industries, the strongest demand for college graduates comes from companies specializing in electronics and missiles, according to placement men.

"There is presently very real competition for the electrical engineers, but more room for selectivity among civils, chemicals and industrials, with mechanicals and aeronauticals falling in between," says H. P. Catlin, head of the student aid department of the Rensselser Polytechnic Institute, Troy, New York.

Wall Street Journal, May 18, 1959

Job Shifting Among Engineers

Post-employment job shifting seems to be especially prevalent among engineers. "Some engineering instructors tell their students to work at three or four jobs before settling down," says an official of

International Harvester Company. "Naturally, we don't want to hire a man who intends to follow that advice, so we try to screen seniors very carefully to avoid the shifters."

Wall Street Journal, May 18, 1959

Income and Salary Survey

The National Society of Professional Engineers has recently released its fourth, biennial issue of Professional Engineers' Income and Salary Survey 1958. The survey is a continuing series and gives a detailed picture of engineer earnings by year of entry into the profession, geographical region, type of employer, engineering specialty and a variety of other categories. Figures are based on an analysis of 19,240 questionnaires returned by NSPE members. Some highlights of the 1958 survey are as follows:

1. Median income for professional engineers rose to a record high of $10,000 in 1958.

2. Earnings were high at all levels but gains generally were smaller than those recorded in the first three surveys.

3. Chemical engineers again reported the highest earnings with a median income of $11,170, an increase of $170 over the 1956 figures. Civil engineers remained on the bottom of the salary rung despite a jump in median income from $8,570 to $9,620.

Statistical Publication on Earned Degrees

The latest issue of Earned Degrees Conferred by Higher Educational Institutions 1957-58 was released by the Office of Education in late July. It contains statistics on all degrees earned for the 1957-58 school year. Highlights pertaining to engineering, scientific, and technical personnel are:

1. During 1957-58, a total of 71,016 first-level (bachelor's or first professional) degrees were conferred in the combined areas of engineering, the biological and physical sciences, and mathematics. This constituted 19.4 percent of all first-level degrees, as compared with 18.7 percent in 1956-57 and 17.7 percent in 1955-56.

2. The percentage increase between this year and last for degrees at the first-level was highest in "Biochemistry" (40.2 percent); at the second level (master's), in "Biochemistry" and "Nursing" (54.5 percent in each field); and at the doctorate level, in "Theology" (27.8 percent).

Increased Supply of Math and Science Teachers

The Research Division of the National Education Association has recently published a study entitled Teacher Supply and Demand in Public Schools, 1959. This report is an assemblage of data from approximately 1200 colleges and universities and from almost every school district in the U. S. Some highlights that pertain to science and mathematics teachers are:

1. The college class of 1959 promises to include 4723 prospective new mathematics teachers, an increase of 37.1 percent over the 3445 of a year ago.
2. The 1959 group promises 6984 prospective new teachers of science, an increase of 27.8 percent over the 5467 of a year ago.

Professional Salaries for Women

The highest entry salaries for college women in 1957 went to graduates with degrees in the scientific fields. Women chemists drew the highest starting salary with an average of $4,847. Next were mathematicians and statisticians at $4,675. The average for all occupations was $3,739.

First Jobs of College Women,
Women's Bureau, U. S. Department of Labor

Shortage of Canadian Chemists

Glynn Michael, general manager of the Chemical Institute of Canada, said in an interview that there is a marked shortage of chemists in Canadian industry. Mr. Michael stated that there were almost two openings for every chemistry and chemical engineering graduate this year. According to Mr. Michael, "there is a regrettable tendency for graduates to go to the United States." Starting salaries in the United States, it was reported, are about 10 to 15 percent higher than in Canada.

New York Times, May 31, 1959

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is an Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas 1/ for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications on registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

1/ The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 25.

List of 30 Major Labor Market Areas by Regions

New England

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Paterson-Clifton-Passaic, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Indianapolis, Indiana
Chicago-Calumet, Illinois-Indiana
Detroit, Michigan
Milwaukee-Waukesha, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
St. Louis, Missouri
Kansas City, Missouri-Kansas

South Atlantic

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-July 1959, U. S. Total

Month and Year	All Occupations	Professional and Managerial	Selected Occupations			
			Total	Engineers	Scientists	Draftsmen & Technicians
Jan. 1956	27,887	12,845	6,844	4,792	476	1,576
Jan. 1957	35,629	14,498	9,327	6,349	723	2,255
March	34,390	15,952	9,330	6,428	762	2,140
May	31,452	14,007	8,434	5,976	606	1,852
July	29,144	11,879	7,467	5,437	650	1,380
Sept.	23,208	8,986	5,506	3,946	595	965
Nov.	13,859	5,388	2,908	1,993	323	592
Jan. 1958	14,665	7,726	2,634	1,817	297	520
March	14,451	8,244	3,563	2,717	465	381
May	15,552	9,439	3,572	2,764	397	411
July	14,420	7,514	3,584	2,921	277	386
Sept.	15,363	8,732	5,498	4,447	626	425
Nov.	17,661	9,308	4,924	3,906	610	408
Jan. 1959	16,042	10,530	5,545	4,386	608	551
March	17,960	10,820	5,654	4,278	757	619
May R/	23,232	12,828	5,860	4,387	827	646
July P/	20,559	10,112	5,522	4,150	671	701

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

R/ Revised
P/ Preliminary

Table II. Clearance Openings in Selected Occupations
May 1959, March 1959, and May 1958,
U. S. Total

Occupation	May 1959	March 1959	May 1958	Percent Change to May 1959 from:		Percentage Distribution May 1959
				March 1959	May 1958	
All selected occupations	5,860	5,654	3,572	+3.6	+64.1	100.0
Professional						
Engineers, total	4,387	4,278	2,764	+2.5	+58.7	74.9
Metallurgical	56	40	38	+40.0	+47.4	1.0
Chemical	97	103	70	-5.8	+38.6	1.7
Civil	364	397	807	-8.3	-54.9	6.2
Electrical	1,910	1,891	787	+1.0	+142.7	32.6
Industrial	231	211	186	+9.5	+24.2	3.9
Mechanical (except aero.)	909	918	616	-1.0	+47.6	15.5
Aeronautical	818	715	258	+14.4	+217.1	14.0
Mining	2	3	2	a/	a/	b/
Other professional	827	757	397	+9.2	+108.3	14.1
Physicists	200	184	105	+8.6	+90.5	3.4
Mathematicians	196	170	79	+15.3	+148.1	3.3
Chemists	89	115	98	-22.6	-9.2	1.5
Life scientists	92	83	33	+10.8	+178.8	1.6
Writers, tech. pubs.	225	181	67	+24.3	+235.8	3.8
Physical scientists	23	23	6	a/	a/	.4
Statisticians	2	1	9	a/	a/	b/
Semiprofessional						
Draftsmen, total	402	391	244	+2.8	+64.8	6.9
Mechanical	160	176	65	-9.1	+146.2	4.1
Other	242	215	179	+12.6	+35.2	2.7
Laboratory technicians and assistants, total	244	228	167	+7.0	+46.1	4.2
Medical technicians	184	181	135	+1.7	+36.3	3.1

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a/ Percent change not shown where both absolutes are less than 50.
b/ Less than 0.05 percent.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, May and March 1959

Labor Market Area	Chemists		Natural Scientists		Draftsmen		Laboratory Technicians	
	May	March	May	March	May	March	May	March
Total	757	782	620	653	4,509	5,903	2,229	2,775
Boston	27	43	26	13	174	172	125	91
Providence	10	12	4	3	44	43	23	30
Buffalo	27	28	14	12	110	97	71	85
New York	200	194	128	170	934	39	352	359
Paterson-Clifton-Passaic	15	19	3	4	60	74	47	44
Newark-Jersey City	44	66	14	21	133	185	106	165
Philadelphia	37	32	28	31	461	515	211	223
Pittsburgh	44	46	21	24	501	586	252	318
Baltimore	10	9	2	6	79	69	32	39
Washington, D. C.	37	20	52	51	66	78	69	66
Louisville	6	3	1	2	26	16	20	23
Atlanta	7	4	10	4	26	43	23	27
New Orleans	7	16	35	18	53	61	25	38
Houston-Baytown	24	16	44	29	99	123	44	54
Dallas	7	8	24	28	58	106	28	37
St. Louis	6	9	9	12	63	79	26	59
Kansas City	10	8	9	6	37	32	31	35
Indianapolis	3	4	4	1	4	17	19	29
Cincinnati	8	6	7	2	30	38	42	21
Columbus	1	5	4	3	12	18	11	17
Cleveland	19	12	7	9	155	282	26	67
Detroit	22	24	6	6	207	631	18	160
Chicago-Calumet	43	55	18	23	174	214	94	113
Milwaukee-Waukesha	25	18	23	21	12	53	16	31
Minneapolis-St. Paul	8	15	7	15	67	132	37	42
Denver	8	6	33	30	38	29	38	36
Los Angeles-Long Beach	58	61	46	72	576	751	256	344
San Francisco-Oakland	38	33	30	21	232	264	149	172
Portland	3	8	2	7	32	23	26	38
Seattle	3	2	9	9	46	33	12	12

Table IV. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, End of Month, May and March 1959

Labor Market Area	Chemists		Natural Scientists		Draftsmen		Laboratory Technicians	
	May	March	May	March	May	March	May	March
Total	170	160	364	455	790	556	423	440
Boston	6	7	19	51	58	70	51	65
Providence	1	1	1	1	3	6	3	2
Buffalo	5	7	44	31	19	8	21	18
New York	24	26	5	17	56	38	58	101
Paterson-Clifton-Passaic	0	0	3	3	27	6	5	3
Newark-Jersey City	22	7	6	1	14	9	6	6
Philadelphia	0	0	0	0	12	9	9	8
Pittsburgh	11	4	3	3	17	3	10	8
Baltimore	0	0	1	2	7	10	2	3
Washington, D. C.	1	1	24	21	4	4	33	17
Louisville	0	1	0	0	2	2	4	0
Atlanta	1	0	1	1	11	9	2	8
New Orleans	0	0	0	0	2	1	2	1
Houston-Baytown	0	0	1	0	9	5	3	1
Dallas	2	2	1	4	14	10	1	1
St. Louis	4	2	1	1	22	25	9	12
Kansas City	1	2	0	0	5	6	6	7
Indianapolis	2	2	2	2	5	6	4	1
Cincinnati	3	4	4	5	10	5	1	4
Columbus	0	1	1	2	14	8	10	3
Cleveland	8	8	5	1	18	10	15	13
Detroit	2	2	1	0	11	6	1	5
Chicago-Calumet	15	13	1	11	33	21	14	27
Milwaukee-Waukesha	7	5	114	10	117	44	24	19
Minneapolis-St. Paul	14	20	17	10	74	53	31	27
Denver	0	1	3	6	14	8	15	17
Los Angeles-Long Beach	37	35	41	43	165	133	65	43
San Francisco-Oakland	4	9	3	3	17	20	12	16
Portland	0	0	0	0	14	12	5	3
Seattle	0	0	62	226	16	9	1	1

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CURRENT LABOR MARKET CONDITIONS in ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

SEPTEMBER 1959

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director

Washington 25, D. C.

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CURRENT LABOR MARKET CONDITIONS

in

ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

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Washington 25, D. C.

Office of Program Review and Analysis
Louis Levine, Deputy Director, Bureau of Employment Security

This bimonthly report is prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It is based on field reports on current conditions in 30 major labor market areas, statistics on job openings for selected engineering, scientific and technical occupations placed in inter-area clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources.

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Trend Indicators

DEMAND FOR ENGINEERS NOT LIKELY TO MODERATE IN NEAR FUTURE.

Several areas predict no diminution in the demand for engineers and scientists. The forecast is based, in part, on expansion of research facilities in established centers to tap the pool of existing talent. From Boston: "A careful evaluation of the quantitative factors and of the equally important intangibles indicates that the basic disparity between supply and demand will continue far into the future." From San Francisco: "It is expected that demand will continue strong in the selected occupations over the next two months, especially in the engineering groups. Consulting firms are continuing to get new business, and they will remain in the market for needed help as long as their workload is expanding." From Indianapolis: "Demand for engineers in construction is not likely to decrease in the near future."

NEW DEVELOPMENTS AFFECTING DEMAND FOR ENGINEERS.

Decentralization of research facilities: Many research laboratories and electronics plants in the Boston area are reaching their optimum size and their demands for administrative, professional, and technical personnel are beginning to moderate as decentralization programs are instituted or expanded. Laboratories are establishing new research facilities outside the area to handle new projects. For example, a major research organization is setting up a branch in California and some engineers and scientists will be transferred there.

New plants: A partially offsetting feature is the setting up of small, new research and development concerns with requirements for workers in the engineering and scientific occupations.

PRONOUNCED SHORTAGES OF QUALITY APPLICANTS.

Despite the persistent, overall shortage of engineers and scientists, there has been no relaxation of employers' job specifications reported. In fact, it is claimed that hiring specifications have become stricter in some areas during the year. Employers are demanding more specialized experience, longer periods of training in the particular field, and post-graduate training. The requirements for electrical engineers may be used to illustrate this trend. The preference is for applicants with advanced engineering degrees. Experience requirements ranged from six months to ten years in such fields as transistor circuitry design, quality control programs for airborne electronics, development of guidance and control systems, nuclear systems studies, design or development of complex test equipment, electro-mechanical and optical equipment, complete communication and navigational systems, and missile telemetering systems. . . In San Francisco, some firms are reportedly turning down contracts because of the inability to obtain mechanical and electrical engineers with experience in heating, ventilating, and lighting. There are almost no qualified applicants and the firms are too busy to spare help to train inexperienced workers. The difficulty in finding electrical and mechanical engineers with commercial building experience is attributed to the siphoning off of new graduates by the large companies in the "glamour" industries--missiles, aircraft, and electronics.

Even in areas in which there are surpluses of nationally scarce types of manpower, the quality applicant can be placed without difficulty. Buffalo, which has reported a surplus of many classifications of engineers, stated: "Technically trained, qualified workers in these fields, with requisite specialized college degrees and recent experience, can be placed even in present market. . ."

BUSINESS INDICATOR:

The labor market situation for industrial engineers and draftsmen may be used as a barometer of economic conditions according to one area report. During periods of expansion, as at present, workers in these occupations are in demand for time and cost studies and the design of materials, products, packaging, and plant layouts. At the beginning of a slump in business activity, demand for these occupational skills is sharply curtailed as industrial engineers and draftsmen are usually among the first to feel the effect of an impending recession.

JOB MARKET FOR GRADUATES--EXCELLENT:

Two engineering schools in the Pittsburgh area reported that practically all their graduates have been placed by mid-summer. Carnegie Institute of Technology stated 98 percent of their 265 engineers already have employment, while the University of Pittsburgh, with 296 graduates, found 95 percent of them with definite jobs.

Both schools stated that salary offers were running about 5 percent higher than last year.

Carnegie Institute of Technology reported some employers planned to double their quotas next year.

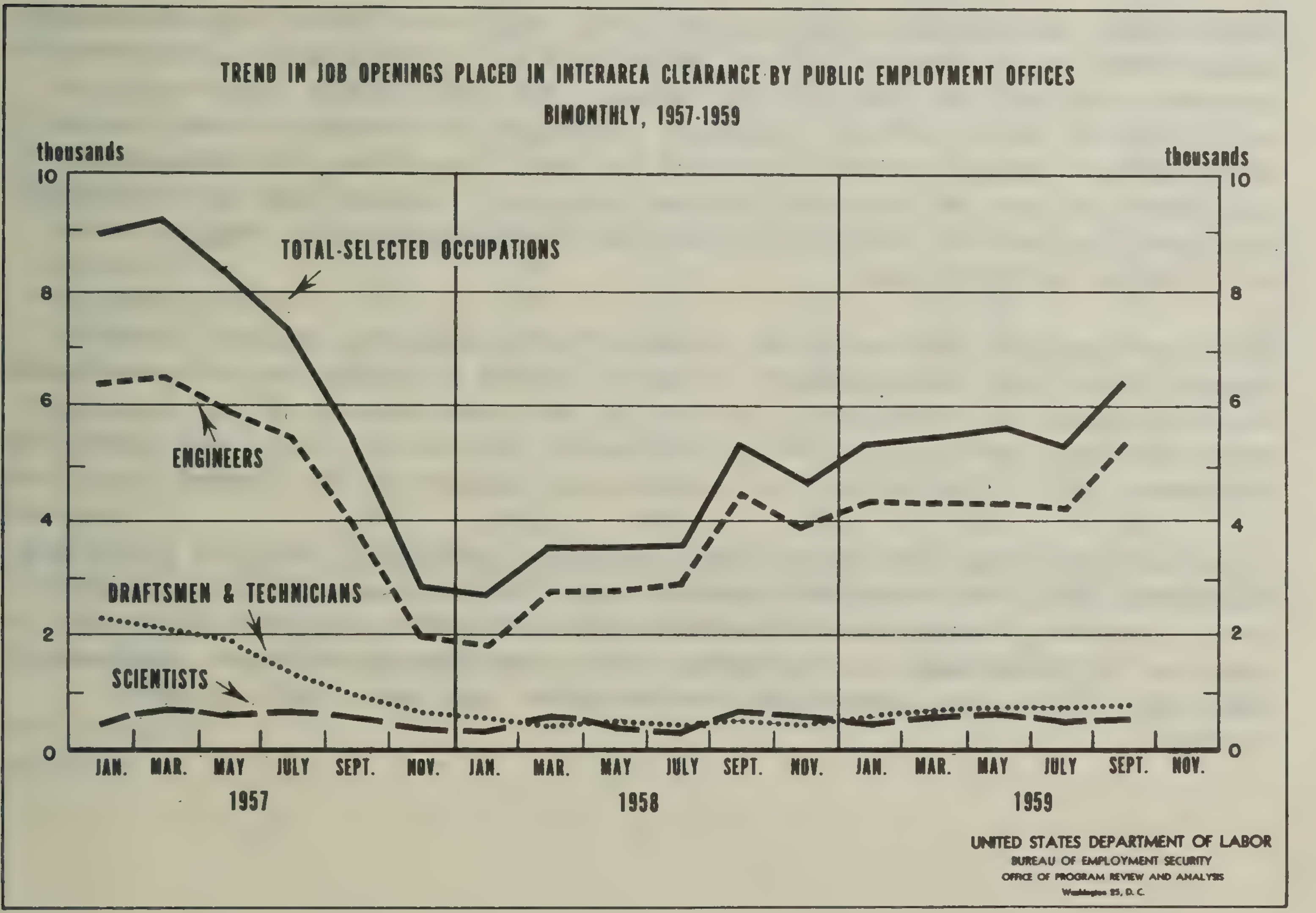
Toward the end of each college quarter, numerous nationwide openings appear in local newspapers to attract graduates of the Georgia Institute of Technology. . .

In Baltimore, almost all the June graduate engineers have secured jobs with little difficulty.

Exception: Dallas reported a considerable increase in supply of professional personnel due largely to the entry into the labor force of college graduates with degrees in the selected fields.

recent developments in INTERAREA RECRUITMENT

After dipping slightly in July, clearance openings for the 18 selected engineering, scientific, and related occupations pushed upward in September. A sharp increase in listings for engineers, coupled with minor numerical changes in openings for scientific and supporting occupations, boosted listings in the selected occupations by 1,100, or 21 percent, from July to 6,400 in September. The September vacancies were not only at a new high for the year but were also more numerous than in any month in 1958. However, they were substantially less than the pre-recession high of 9,000 in the early months of 1957.



TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES

BIMONTHLY, 1957-1959

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

Engineering vacancies placed in interarea clearance by local employment offices, which had hovered around the 4,300 level in the early months of the year and dipped to 4,125 in July, expanded sharply in September. All classifications of engineers participated in the advance except civil engineers. The decline in demand for civil engineers was due to the withdrawal of openings by a major aircraft company in Washington for workers with experience in structural design, stress, and research and test fields.

The largest numerical increase in demand among engineers was for electrical specialists. It was due in large part to stepped up requirements of the missile industry in Washington State. A contributing factor was national recruitment for a communication equipment manufacturer in North Carolina who was expanding after receiving substantial contracts for complex electronic military devices and systems. As a result of these and other changes, clearance listings for electrical engineers rose by 650, or one-third, to 2,600 in July. Vacancies for this group of engineers represented half of all engineering vacancies.

Industrial, mechanical, and aeronautical engineers showed approximately equal numerical advances in job opportunities in September, with increases over July in the 150-160 range. The additional opportunities reflected in local office clearance listings for industrial engineers were in the communications industry in North Carolina; for mechanical engineers in the jet aircraft engine industry in Ohio and the aircraft and missile industry in California, and for aeronautical engineers in California and Oklahoma.

Job opportunities for selected scientific occupations showed little change from July to September. Demand dipped slightly for mathematicians but increased for chemists. Virtually the same number of job openings were reported for physicists in September 1959 as in July 1959 and September 1958, indicating the continuing nature of the demand.

Clearance openings for supporting technical personnel such as draftsmen increased over the bimonthly period from 500 in July to 570 in September. However, demand eased somewhat for laboratory technicians. Vacancies for draftsmen in September were more than double the number a year ago, while for laboratory technicians they were only slightly higher.

Number of Nonagricultural Job Openings in Selected Occupations 1/ in Interarea Clearance at Public Employment Offices, U. S. Total, September 1959, July 1959, and September 1958

Selected Occupations	Job Openings			Change to September 1959 from:			
				July 1959		September 1958	
	Sept. P/ 1959	July R/ 1959	Sept. 1958	Number	Percent	Number	Percent
All Selected Occupations	6,416	5,315	5,303	+1,101	+20.7	+1,113	+21.0
Engineers, total	5,169	4,128	4,447	+1,041	+25.2	+722	+16.2
Chemical	107	89	54	18	+20.2	+53	+98.1
Civil	221	357	799	-136	-38.1	-578	-72.3
Electrical	2,606	1,947	1,750	+659	+33.8	+856	+48.9
Industrial	307	150	156	+157	+104.7	+151	+96.8
Mechanical 2/	970	810	1,033	+160	+19.8	-63	-6.1
Aeronautical	879	721	633	+158	+21.9	+246	+38.9
Selected Scientific Occupations	493	486	431	+7	+1.4	+62	+14.4
Natural scientists	356	368	352	-12	-3.1	+4	+1.1
Physicists	157	156	156	+1	+0.6	+1	+0.6
Mathematicians	146	160	163	-14	-8.8	-17	-10.4
Other	53	52	33	+1	+1.9	+20	+60.6
Chemists	137	118	79	+19	+16.1	+58	+73.4
Draftsmen	571	495	255	+76	+15.4	+316	+123.9
Laboratory technicians	183	206	170	-23	-11.2	+13	+7.6

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

2/ Mechanical, except aeronautical.

P/ Preliminary

R/ Revised

CURRENT TRENDS IN LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

Recruitment of engineers, scientists, and related technical personnel continued through the summer without letup. Employers hired most of the members of college graduating classes directly from the campus with the result that very few 1959 college graduates in these occupational groups registered for work at public employment offices.

Operating statistics of public employment offices in the 30 major labor market areas also showed other evidence of the continuing active recruitment in these fields, particularly in engineering. The number of engineering openings received rose 30 percent from May to July although openings received for other occupations in the selected groups showed declines. Openings unfilled at the end of July rose 13 percent over May for engineers but dropped 8 percent for all other selected occupations combined. The number of applicants looking for engineering jobs at public employment offices in the 30 areas declined by 6 percent while the number in the other specified occupations edged up by 1 percent.

The demand was particularly acute for mechanical and aeronautical engineers--further evidence of improved business conditions and expansion in missiles. Shortages of electronic engineers also tended to be persistent.

Over the year, the demand-supply relationship tightened markedly. In July 1958, public employment offices in the 30 major labor market areas reported five applicants in the 18 selected occupations for each unfilled opening. This year, they had only two applicants per opening.

ENGINEERS

Current Demand-Supply Relationship

The overall stringency of engineers intensified from May to July 1959. The steady improvement in general economic conditions and continued expansion in research and development work in the "glamour" industries--missiles, rocketry, space exploration, nuclear applications--not only whittled down the available supply but also absorbed most of the June graduates.

Registrants for engineering positions at public employment offices in the 30 reporting areas declined by 300, or 6 percent, from May to 4,600 in July. The drop was distributed among all engineering classifications, except aeronautical.

Number of Engineering Job Applicants
Registered at Public Employment Offices in 30 Major Labor Market Areas,
July and May 1959, July 1958

Engineering Specialty	Active Applications			Change to July 1959 from:			
				May 1959		July 1958	
	July 1959	May 1959	July 1958	Number	Percent	Number	Percent
Engineers, total	4,615	4,906	8,537	-291	-5.9	-3,922	-45.9
Metallurgical	74	128	153	-54	-42.2	-79	-51.6
Chemical	335	348	611	-13	-3.7	-276	-45.2
Civil	918	967	1,204	-49	-5.1	-286	-23.8
Electrical	684	732	1,241	-48	-6.6	-557	-44.9
Industrial	830	865	1,840	-35	-4.0	-1,010	-54.9
Mechanical	1,642	1,732	3,242	-90	-5.2	-1,600	-49.4
Aeronautical	74	71	153	+3	+4.2	-79	-51.6
Mining	58	63	93	-5	-7.9	-35	-37.6

The changes in active registrations varied among the 30 areas, with most areas showing little or no changes.

The areas with declining registrations of engineers were headed up by New York City, with 105 fewer engineering applicants in July than in May. This sharp drop occurred despite an influx of college students.

However, a surplus of job seeking civil, electrical, industrial, and mechanical engineers still remained in the area. The Buffalo labor market areas with 91 fewer applicants had the second largest decline but this was attributed to outmigration rather than any upturn in demand.

However, Chicago, the area with the largest gain (56), attributed it partly to the effects, direct and indirect, of the steel strike, partly to plant closings because of vacations, and also to some job shopping by applicants. St. Louis and Dallas each reported some 30 more engineering registrants. In these and other areas with increased applicants, the added supply was largely due to recent college graduates entering the labor market.

Job opportunities for qualified engineers in the 30 labor market areas climbed from May to July. Openings received were up 30 percent and unfilled openings 13 percent. The increased demands were principally for aeronautical and mechanical engineers, particularly to meet an upsurge in the requirements of missiles plants in Denver and Los Angeles.

Although public employment offices in the 30 areas received more orders for engineers in July than in May, fewer of them were placed in interarea clearance. The largest declines in clearance openings occurred when orders were withdrawn for mechanical engineers for the aircraft industry in Atlanta and Seattle. However, in the Los Angeles-Long Beach area, firms engaged in research and development work were actively canvassing other areas for electrical and aeronautical engineers through the network of public employment offices.

Demand for engineers nationally, as indicated by the number of vacancies placed in interarea clearance, declined by 250, or 6 percent, to 4,125 in July. All classifications of engineers, except electrical, were affected (see Table 2).

Over-the-Year Changes in the Demand-Supply Situation

For the first time, data are available from operating statistics of public employment offices in 30 major labor market areas which reflect the labor demand-supply relationship for engineers, scientists, and related personnel over the year. Reflecting general recovery and accelerated missile activity, the dominant motive running through the reports from the 30 areas is one of marked improvement in the job market for these workers.

Indicative of the improved job market for engineers is the decline by almost one-half in the number of engineering applicants. The reductions in engineering applications at public employment offices were widespread geographically; only New Orleans and Seattle reported more applicants in July 1959 than a year earlier. The largest declines took place in the Chicago, Cleveland, Detroit, Los Angeles-Long Beach, Newark, New York City, and San Francisco-Oakland areas. Each of these seven areas had from 200 to 700 fewer engineering job seekers in July 1959 than in July 1958.

The changing trend in the demand-supply relationship for engineers is also indicated by the ratio of active applications to unfilled job openings. In July 1958, two engineering job applicants were available at public employment offices for each unfilled job. A year later the ratio fell to 1 to 1.

The strongest increase in demand over the year was for electrical engineers. In the 30 areas, the relative increase in unfilled openings for this specialization was three times that for all other engineering classifications. Also, clearance openings in the 30 areas for electrical engineers were up 60 percent in contrast to a decline of 15 percent in the clearance listings for engineers other than electrical. Nationally, clearance openings for electrical engineers doubled but for all other specializations the rise was only 13 percent. Demands for electrical engineers were primarily for research and development in the fields of electronics, missiles, and nuclear applications.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	
New England Region:							
Boston, Mass.	208	235	283	131	123	63	Shortage of engineers continues severe. Serious shortage of electrical and electronics engineers. Other classifications of engineers also in short supply except mining and civil engineers. Civil engineers in fair supply while mining engineers not used to any extent in this area.
Providence, R. I.	52	61	76	6	11	5	
Middle Atlantic Region:							
Buffalo, N. Y.	137	228	140	29	95	198	Labor demand-supply relationships eased since May. While number of active applications declined significantly in most engineering categories, number of openings received and unfilled openings also dropped in most of these occupations. Shortages of electrical engineers evaporated between May and July. No specified occupation in significant short supply in July.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	
Middle Atlantic Region: Cont.							
New York, N. Y.	673	778	1,534	67	70	INA	Increases in job opportunities failed to absorb all engineering applicants. Civil, electrical, industrial, and mechanical engineers more numerous than openings.
Paterson-Clifton-Passaic, N. J.	113	108	198	107	83	30	Greatest demand for electrical engineers. Of the 107 openings unfilled at end of July, 88 were for electrical engineers.
Newark-Jersey City, N. J.	168	175	589	60	44	48	Reflecting the improvement in general business conditions, the demand-supply relationship of engineers tightened from May to July. Electrical engineers continue to be in short supply, with most openings in research and development.
Philadelphia, Pa.	452	449	517	133	161	72	Supply of applicants remained unchanged from May to July but openings fell sharply.
Pittsburgh, Pa.	245	273	335	53	43	22	Demand-supply situation tightened; number of applicants dropped while openings increased.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	
East N. Central Region:							
Cincinnati, Ohio	32	40	63	225	214	242	Demand for engineers continues strong. Openings are for persons qualified to aid in research and development programs in electronincs, aeronautics, astronautics, and nuclear applications, mostly on defense contracts.
Columbus, Ohio	17	23	49	93	16	26	Applications continue to drop with steady improvement in overall conditions. Well-qualified engineers in demand with the recovery and development of markets for goods and services utilized by consumers, industry, and government.
Cleveland, Ohio	139	140	419	55	53	17	No significant change.
Indianapolis, Ind.	18	14	44	31	21	12	Slight increase in the number of engineering applicants from May to July despite out-of-area recruitment. Electrical, industrial, and mechanical engineers in greatest demand.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	
East N. Central Region: Cont.							
Chicago-Calumet, Ill.-Ind.	268	212	502	153	155	49	Demand-supply situation for engineers eased slightly between May and July. Engineering applications at local offices increased but unfilled openings fell off slightly.
Detroit, Mich.	280	292	704	9	33	281	Decline in active applications due to drop in applications from mechanical engineers. Sharp over-the-year loss in unfilled openings stemmed from the withdrawal of orders placed in anticipation of a government contract that did not materialize.
Milwaukee-Waukesha, Wis.	113	110	167	331	341	140	Local demand continues strong for electrical engineers for research and development, primarily in missile guidance and nuclear power fields.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	
West N. Central Region:							
Minneapolis-St. Paul, Minn.	70	104	164	149	102	59	Applications from engineers continued to drop despite the addition to the labor force of June graduates. Decline greatest for industrial and mechanical engineers. Backlog of unfilled openings rose almost 50 percent due to a surge in orders for electrical engineers in June.
St. Louis, Mo.	92	61	110	81	67	15	Demand-supply relationship showed little change between May and July.
Kansas City, Kansas-Mo.	26	19	INA	6	22	INA	Demand-supply situation eased. Openings fell while the number of job applicants rose.
South Atlantic Region:							
Baltimore, Md.	10	58	76	97	108	38	Supply, as reflected by active applications, dropped considerably in last 60 days. However, May and July figures are not entirely comparable due to change in validity period from 60 days to 30 days as of June 1.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications July 1959	Active Applications May 1959	Active Applications July 1958	Openings Unfilled at end of: July 1959	Openings Unfilled at end of: May 1959	Openings Unfilled at end of: July 1958	Comments
South Atlantic Region: Cont.							
Washington, D. C.	124	111	123	90	116	386	Decrease in hiring activities in several large government agencies resulted in drop in number of openings for engineers.
Atlanta, Ga.	60	45	83	5	4	6	Increase in job applicants without corresponding offset in orders resulted in easing of demand-supply relationship.
East S. Central Region:							
Louisville, Ky.	16	25	39	6	7	2	No significant change.
West S. Central Region:							
New Orleans, La.	70	44	65	6	18	10	Recent college graduates entering the labor force, completion of some engineering projects, and employed workers seeking better jobs, resulted in an increase in engineering applications. Local demands for workers in engineering occupations declined when the staffing needs of a new plant were fulfilled and oil exploration activities curtailed.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	
West S. Central Region: Cont.							
Houston-Baytown, Texas	98	95	200	15	8	19	Many engineers left this area causing drop in number of applicants of 50 percent over the year; however, no shortage considered to exist.
Dallas, Texas	110	80	126	73	60	264	Little permanent change in tight demand-supply situation despite increase in visible supply. Many applicants placed substantial restrictions on their availability and, in most cases, do not meet specific job requirements of available openings.
Mountain Region:							
Denver, Colorado	120	175	168	326	59	130	Tight labor market situation showed no signs of abating. If anything, it became more pronounced with the expansion of research facilities in the area.
Pacific Region:							
Seattle, Wash.	58	43	57	904	900	888	Demand remained constant for engineers in all classifications.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, July 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	
Pacific Region: Cont.							
Portland, Oreg.	50	41	66	26	9	11	Demand climbed when U. S. Forest Service placed order for 20 engineers. Meanwhile supply of engineering applicants rose because of registrations by college students and job-shopping vacationists.
Los Angeles-Long Beach, Calif.	577	655	1,209	983	790	682	Local firms are increasing their outlays for research, design, and development in order to meet competition for new contracts. These are indicated in the buildup in unfilled openings. Strongest demand continues for electrical and aeronautical engineers with advanced degrees and extensive experience in specialized fields.
San Francisco-Oakland, Calif.	219	212	431	39	52	49	Demand-supply situation eased from May to July with an increase in applicants, coupled with a decline in unfilled orders. But current demand continues high while matching supply is limited, especially in the mechanical and electrical fields, and, in the latter, in electronics.

NATURAL SCIENTISTS

While shortages persisted for specific types of natural scientists in some areas, the job market for this category generally eased from May to July. In the 30 major labor market areas providing detailed information on these occupations, as well as in the country as a whole, demand fell off. Meanwhile, the supply of natural scientists, as indicated by applicants at public employment offices in the 30 major labor market areas, increased. The rise in applicants was generally due to recent graduates entering the labor market.

The loosening labor demand-supply relationship is also mirrored in the ratio of active applications to unfilled job openings. This ratio rose from 5 applicants to every 3 unfilled openings in May to 7 applicants to 3 unfilled openings in July.

Job opportunities for natural scientists varied markedly among the reporting labor market areas. A qualified applicant would have difficulty in landing a job in Buffalo where shortages evaporated. Pittsburgh would also present problems to the applicant because the research laboratories and industrial plants reported no serious shortages. However, he might be more fortunate in Seattle if he were a mathematician or physicist. There, demand for these natural scientists exceeded the supply.

Another area with virtually no local supply is Boston. New firms locating in that research center need qualified scientists. Thus, one of them concerned with inertial guidance systems for missiles is aiming for a staff of 100, a third of which will be engineers and scientists. Another firm, engaged in activities designed to improve weather observation and forecasting through automation, is seeking to augment its staff with scientists experienced in simulation techniques, programming research, operations research, systems analysis, and mathematical statistics.

An interesting note to the shortage of scientists and engineers in the Boston area: The deficit also extends to supporting occupations such as technical illustrators and writers and experimental and research machinists.

CHEMISTS

The supply of chemists continued to outstrip demand, despite an increase in job opportunities. Evidence of the relatively loose supply situation is found in an increase of 100 job seekers in this field in the 30 areas from May to 848 in July, a rise of 13 percent. In contrast, unfilled openings for chemists numbered 161 in July, up by 10 percent from May.

The upturn in demand for chemists was particularly marked in the San Francisco-Oakland labor market area, where seasonal improvements in industries using chemists reduced the number of job seekers from 38 in May to 20 in July. The latter figure compares with 88 in July 1958.

The Boston area reported an increase in demand for chemists which was not reflected in the operating statistics of the employment service. A number of firms in the area were reported to be seeking chemists with advanced training and experience in specialized fields. Seattle had an increase in job seekers in this field, mostly college graduates but no vacancies.

DRAFTSMEN

The supply of draftsmen in July was generally adequate to meet the demand: No area reported a serious shortage. For the 30 areas combined, the number of active applications showed little change from May when 4,500 were filed at public employment offices. The aggregate figure obscures a variety of offsets: A sharp decline in applicants in the New York City area, but increases in Chicago, Cleveland, and Portland due to registrations of recent graduates and students. In at least one area--San Francisco-Oakland--there was not much change in the applicant file because of uncertainty resulting from the steel situation and reports that construction projects were being delayed due to financing problems.

Despite the existence of a large supply of draftsmen, unfilled openings persisted, usually because a specific type of experience was required. The Chicago report noted a rise in unfilled openings while applications also increased, and commented that matching was difficult because of stringent job specifications. Training and experience requirements also hindered filling of openings in Los Angeles. A number of these unfilled jobs required training in commercial art and experience in industrial illustration work.

The demand-supply relationship for draftsmen improved considerably over the year. The number of applicants in July was almost half the number a year ago while unfilled openings rose two and one-half times over this period.

LABORATORY TECHNICIANS AND ASSISTANTS

Except for an extreme shortage of medical technologists, the manpower situation for laboratory technicians was still one of excess supply in July. Nevertheless, many openings in this field go unfilled despite intensive recruitment. Part of the difficulty stems from the fact that many applicants either do not have the specific training being sought or a license, but part is also attributed to low salary offers.

Overall, the number of job seekers in this field varied little between May and July. However, this resulted from changes in supply in different areas offsetting each other. Completion of early stages of model changeovers resulted in large numerical increases in job seekers in Detroit. In San Francisco, a rise in applicants was due to recent graduates, many with laboratory and chemistry training, entering the labor market. These gains, as well as smaller ones in other areas, were more than counterbalanced by a sharp drop in the New York City area, and some declines in the Boston, Buffalo, Baltimore, and Washington, D. C. areas.

Laboratory technicians and assistants had the advantage of an improved labor market in July over a year earlier. The demand for these workers, as indicated by clearance openings and unfilled openings, was up while supply fell by two-fifths.

DIGEST

of related information

Bright Outlook for Graduates

A survey including 78 technical schools and university engineering colleges reveals that 1959 would be a good, healthy placement year. The 24th Annual University and College Placement Survey of Northwestern National Life indicates that engineers' starting salaries will average between $490 and $510 per month as compared to $385-$420 for business graduates. Placement officials particularly noticed an increase in recruiting of engineers by defense industries.

Engineering Employment Practices
Newsletter, August 1959

Earnings of Engineering Graduates of Ohio State

Ohio State University's 393 June engineering graduates are employed at an average of $526 per month. Positions in industry were the choice of almost two-thirds of the group while 22 were employed by the government, 3 became teachers, and 37 remained for advanced degrees. The average monthly income for engineers with Master's degrees was $572 and for Ph.D's it was from $775 to $1,000. According to the Ohio State placement office, "Predictions generally point to a continuing year of favorable employment opportunities for engineering graduates and alumni."

Engineering Employment Practices
Newsletter, September 1959

Demand for College Science Teachers

The National Education Association released the third biennial report of its research division on the professional personnel needs of institutions of higher learning, Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1957-58 and 1958-59. The data refer to 938 degree-granting institutions with an enrollment in October 1958 of about 1,700,000 full-time and 600,000 part-time students of college grade. Some of the report findings are:

1. Full-time teaching positions unfilled in the last or current year were widespread among the teaching fields, but mathematics, engineering, and the sciences were emphasized as the fields of most critical shortage. Unfilled engineering positions totaling 172 were reported by 91 institutions; 162 unfilled mathematics positions were reported by 118 institutions; and 253 physical science positions were reported by 198 institutions.

2. Only a relatively small proportion of the doctor's degree graduates in fields of engineering and science are attracted to educational service.

3. "If the present distribution of teachers among the fields of instruction remains about constant, the social sciences will call for more than 37,000 recruits during the next decade, as will also the fine arts. Then will come English and the physical sciences, each needing more than 28,000. Chemistry alone will be in almost certain need of as many as 13,000. Engineering stands out with a probable demand for something like 25,000."

Career Development of Engineers

A study of Purdue engineering graduates of the 1911 through 1956 classes was made to provide educational institutions with information to evaluate the training given graduates. Some conclusions were:

1. "About 80 to 90% of the Purdue engineering graduates pursued a career in engineering throughout their active career. Over 50% of the alumni were employed in the engineering field in which they received their degree. The versatility of an engineering training was evidenced by the fact that over 20% were employed in a field of engineering other than that in which they received their degree.

2. "Over 30 percent of the alumni were engaged in design, research and development within five years after graduation, a fact which suggests that engineers are employed in capacities consistent with their training.

3. "About 35 to 40 percent of the alumni were in management positions twenty-five to thirty years after college graduation.

4. "The average engineering graduate required approximately 15 years to entrench himself firmly into the profession. He reached his top position in approximately twenty-five years.

5. "Twenty-five years after graduation, 50 percent of the alumni held at least the job title of 'Assistant Chief Engineer.' Within thirty years after graduation, 25 percent held the title of 'Vice President' and 10 percent held the title of 'President.'

6. "Good scholarship was invaluable in terms of salary and position. The better students are more apt to hold more responsible jobs and receive higher salaries.

7. "Graduate study had remunerative value only at the doctor's degree level. A master's degree seemed to have little bearing on future income."

Journal of Engineering Education, June 1959

Executive Engineers Needed

The Executive Manpower Corporation conducted a survey of leading business corporations and found that 23.6 percent of the 5,600 top executives needed by industry in the next six months will be executive engineers. The only higher need is in the manufacturing-production field, 25.7 percent, and many in that category will be engineers. Management expects these high level engineering positions will be the hardest to fill.

Engineering Employment Practices
Newsletter, September 1959

Missiles Center

The San Jose area is a fast growing center of research and manufacturing plants engaged in designing and producing various types of the most modern equipment. The continued arrival of new firms and the expansion of "older" plants engaged in designing or manufacturing components of missiles, satellites, spacecraft, electronic data processing and storing equipment and other instruments has intensified previous shortages of professional and technical workers. In response to the growing demand for a highly skilled labor force, the area's universities, colleges and other educational institutions are steadily expanding their research and engineering departments and other training facilities. Many of the scientists, engineers, department heads and technicians of the area's firms connected with missile, space and electronics research programs act as instructors in their fields of specialization.

California Department of Employment
San Jose Labor Market Report, August 1959

Is There an Engineering Shortage?

Bernard M. Gordon, President of Epsco, Inc., an electronics firm, does not believe that a real engineer shortage exists. The problem lies in unbalanced staffing of high-level engineers rather than a real shortage. Too many engineers are being attracted to academic-oriented laboratories operating on a cost-plus-fixed-fee basis and fewer are doing practical design work. Theoretical studies are being emphasized at the expense of practical design problems.

Mr. Gordon says that "Relatively few scientists are needed to keep a large number of practical, resourceful engineers working to produce products and machines for industry and defense." If our engineers continue to emphasize theory and "do not devote their full experience and knowledge to the practical problems of equipment design and production, we will fail in the international race for scientific supremacy."

The solution to the engineering problem, Gordon claims, lies primarily in a "back to engineering" movement for engineers. "It is probable that if only 10 percent of the country's would-be electronic scientists can be motivated to return to the true purpose of engineering, the productive engineering force can be tripled."

Electronic Design, July 8, 1959

Overcoming the Shortage of Educated Manpower

The University of Pittsburgh is revolutionizing the academic calendar in an attempt to alleviate the shortage of highly educated manpower. It is scrapping the leisurely two semester calendar with its 3-month summer vacation. In its place it is substituting an 11-month schedule with three trimesters. The academic year will then run from September through December; January through March; and April through July, leaving August free for one month of general vacation.

This would permit the Pittsburgh student, in a period of three years and one trimester (still five months' less calendar time than it conventionally requires to complete a normal four years of undergraduate studies), to emerge with both a full liberal arts education plus a master's degree in the field of his specialized professional career.

Saturday Review, September 12, 1959

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is the Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas [1] for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

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[1] The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 26.

List of 30 Major Labor Market Areas by Regions

New England:

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Paterson-Clifton-Passaic, New Jersey
Newark-Jersey City, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Columbus, Ohio
Cleveland, Ohio
Indianapolis, Indiana
Chicago-Calumet, Illinois-Indiana
Detroit, Michigan
Milwaukee-Waukesha, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
St. Louis, Missouri
Kansas City, Missouri-Kansas

South Atlantic:

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Houston-Baytown, Texas
Dallas, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-September 1959

Month and Year	All Occupations	Professional & Managerial	Selected Occupations 1/				
			Total	Engineers	Scientific	Draftsmen	Technicians
Jan. 1956	27,887	12,845	6,803	4,792	435	1,361	215
Jan. 1957	35,629	14,498	8,993	6,349	389	1,988	267
March	34,390	15,952	9,300	6,428	732	1,851	289
May	31,452	14,007	8,404	5,976	576	1,591	261
July	29,144	11,879	7,407	5,437	590	1,174	206
Sept.	23,208	8,986	5,480	3,946	569	791	174
Nov.	13,859	5,388	2,879	1,993	294	384	208
Jan. 1958	14,665	7,726	2,582	1,817	245	315	205
March	14,451	8,244	3,496	2,717	398	204	177
May	15,552	9,439	3,505	2,764	330	244	167
July	14,420	7,514	3,540	2,921	233	212	174
Sept.	15,363	8,732	5,303	4,447	431	255	170
Nov.	17,661	9,308	4,789	3,906	475	243	165
Jan. 1959	16,042	10,530	5,426	4,386	489	377	174
March	17,960	10,820	5,473	4,278	576	391	228
May	23,232	12,828	5,635	4,387	602	402	244
July R/	20,559	10,112	5,315	4,128	486	495	206
Sept. P/	21,414	10,140	6,416	5,169	493	571	183

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

R/ Revised
P/ Preliminary

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Table II. Clearance Openings in Selected Occupations 1/
July 1959, May 1959, and July 1958

Occupation	July 1959	May 1959	July 1958	Percent Change to July 1959 from: May 1959	Percent Change to July 1959 from: July 1958	Percentage Distribution July 1959
All selected occupations	5,315	5,635	3,540	-5.7	+50.1	100.0
Professional						
Engineers, total	4,128	4,387	2,921	-5.9	+41.3	77.7
Metallurgical	48	56	31	-14.3	+54.8	0.9
Chemical	89	97	50	-8.2	+78.0	1.7
Civil	357	364	794	-1.9	-55.0	6.7
Electrical	1,947	1,910	994	+1.9	+95.9	36.6
Industrial	150	231	136	-35.1	+10.3	2.8
Mechanical (exc. aero.)	810	909	648	-10.9	+25.0	15.2
Aeronautical	721	818	267	-11.9	+170.0	13.6
Mining	6	2	1	+200.0	+500.0	0.1
Other professional	486	602	233	-19.3	+108.6	9.1
Natural scientists	368	513	172	-28.3	+114.0	6.9
Physicists	156	200	67	-22.0	+132.8	2.9
Mathematicians	160	196	70	-18.4	+128.6	3.0
Statisticians	2	2	5	a/	a/	b/
Life scientists	44	92	24	-51.1	a/	0.8
Earth scientists	6	23	6	a/	a/	0.1
Chemists	118	89	61	+32.6	+93.4	2.2
Semiprofessional						
Draftsmen, total	495	402	212	+23.1	+133.5	9.3
Mechanical	248	160	38	+55.0	+552.6	4.7
Other	247	242	174	+2.1	+42.0	4.6
Laboratory technicians and assistants, total	206	244	174	-15.6	+18.4	3.9
Medical technicians	151	184	118	-17.9	+28.0	2.8

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a/ Percent change not shown where both absolutes are less than 50.
b/ Less than 0.05 percent.

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, July and May 1959, and July 1958

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958
Total	848	750	1,278	708	629	1,066	4,483	4,511	9,766	2,272	2,333	3,721
Boston	42	27	61	37	26	70	199	174	224	95	125	179
Providence	8	10	9	2	4	8	27	44	46	16	23	44
Buffalo	16	27	23	16	14	8	90	110	87	53	71	91
New York	246	193	354	113	137	214	728	934	1,455	254	455	580
Paterson-Clifton-Passaic	15	15	36	3	3	8	59	60	162	32	47	67
Newark-Jersey City	47	44	141	33	14	75	135	133	327	107	106	287
Philadelphia	35	37	38	36	28	39	505	461	734	229	211	294
Pittsburgh	36	44	58	26	21	32	491	501	576	259	250	372
Baltimore	5	10	19	1	2	9	39	79	175	16	32	57
Washington, D. C.	43	37	35	63	52	57	69	66	110	53	69	59
Louisville	4	6	6	3	1	5	33	26	25	16	20	21
Atlanta	18	7	6	15	10	4	40	26	40	27	23	41
New Orleans	7	7	14	35	35	18	50	53	52	25	25	32
Houston-Baytown	30	24	24	30	44	65	104	99	313	49	44	70
Dallas	9	7	12	25	24	41	67	58	104	31	28	39
St. Louis	14	6	6	16	9	5	77	63	115	37	26	45
Kansas City	10	10	INA	10	9	INA	31	37	INA	18	31	INA
Indianapolis	3	3	2	2	4	5	18	4	91	16	19	48
Cincinnati	7	8	10	3	7	0	30	30	62	36	42	61
Columbus	1	1	11	0	4	9	21	12	63	11	11	27
Cleveland	21	19	45	10	7	15	168	155	554	44	26	139
Detroit	27	22	44	0	6	8	273	207	1,485	117	18	217
Chicago-Calumet	50	43	73	18	18	60	240	174	295	98	94	135
Milwaukee-Waukesha	21	25	22	23	23	32	11	12	85	15	16	48
Minneapolis-St. Paul	15	8	24	19	7	28	75	67	154	38	37	53
Denver	24	8	11	50	33	36	49	39	95	65	38	15
Los Angeles-Long Beach	58	58	92	64	46	144	543	576	1,646	270	256	425
San Francisco-Oakland	20	38	88	39	30	60	230	232	557	191	149	208
Portland	3	3	8	3	2	7	36	32	70	29	26	45
Seattle	13	3	6	13	9	4	45	47	64	25	15	22

INA--Information not available.

Table IV. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, End of Month, July and May 1959, and July 1958

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958	July 1959	May 1959	July 1958
Total	161	146	101	305	370	259	765	783	310	383	449	257
Boston	4	6	1	8	19	12	42	58	33	52	51	17
Providence	0	1	1	0	1	1	4	3	2	1	3	1
Buffalo	7	5	3	6	44	14	17	19	11	27	21	18
New York	16	2	INA	3	9	INA	76	56	INA	37	85	INA
Paterson-Clifton-Passaic	1	0	3	3	3	0	21	27	8	14	5	2
Newark-Jersey City	17	22	2	2	6	0	31	14	7	8	6	3
Philadelphia	0	0	4	0	0	1	1	12	3	1	9	8
Pittsburgh	11	11	1	2	3	10	23	17	0	21	10	6
Baltimore	0	0	2	2	1	1	5	7	15	1	2	6
Washington, D. C.	5	1	0	23	24	46	5	4	8	28	33	38
Louisville	2	0	2	0	0	0	4	2	4	1	4	0
Atlanta	0	0	0	0	0	0	5	3	1	1	2	0
New Orleans	0	0	0	0	0	0	2	2	3	1	2	1
Houston-Baytown	1	0	0	2	1	0	13	9	5	1	3	0
Dallas	2	2	10	1	1	92	12	14	10	1	1	9
St. Louis	1	4	1	0	1	1	12	22	5	11	9	6
Kansas City	0	1	INA	0	0	INA	6	5	INA	7	6	INA
Indianapolis	1	2	1	2	2	3	5	5	3	2	4	4
Cincinnati	4	3	9	4	4	29	10	10	18	4	1	7
Columbus	0	0	1	7	1	2	11	14	3	0	10	4
Cleveland	8	8	6	6	5	0	21	18	5	8	15	11
Detroit	1	2	3	0	1	0	4	11	23	1	1	0
Chicago-Calumet	23	15	11	4	1	16	53	33	3	27	14	23
Milwaukee-Waukesha	8	7	7	104	114	12	121	117	38	21	24	10
Minneapolis-St. Paul	16	14	10	10	17	2	27	74	11	24	31	15
Denver	1	0	0	5	6	4	35	15	4	30	12	2
Los Angeles-Long Beach	26	37	9	48	41	7	168	165	55	19	65	39
San Francisco-Oakland	6	3	14	1	3	6	17	17	21	24	12	21
Portland	0	0	0	0	0	0	9	14	6	5	5	1
Seattle	0	0	0	62	62	0	5	16	5	5	3	5

INA--Information not available.

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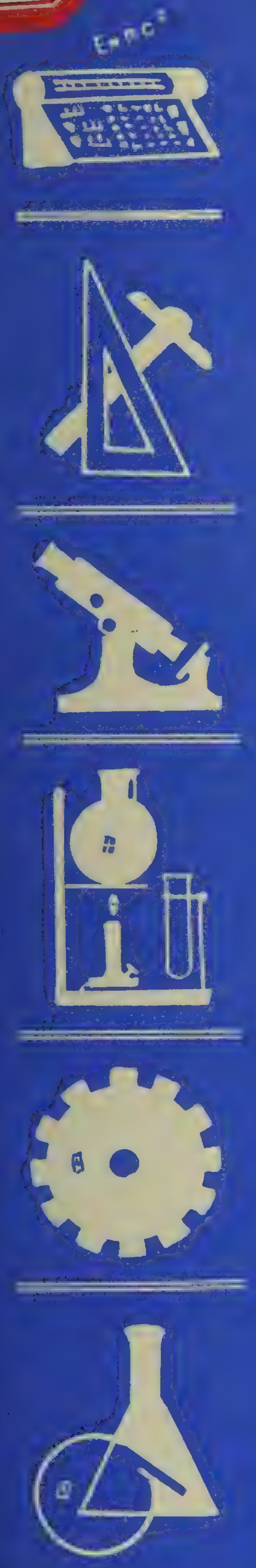

CURRENT LABOR MARKET CONDITIONS in ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

NOVEMBER 1959

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director

Washington 25, D. C.

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Office of Program Review and Analysis
Louis Levine, Deputy Director, Bureau of Employment Security

This bimonthly report is prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It is based on field reports on current conditions in 30 major labor market areas, statistics on job openings for selected engineering, scientific and technical occupations placed in inter-area clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources.

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Trend Indicators

IMPACT OF THE STEEL STRIKE on demand-supply conditions in engineering, scientific and technical occupations among the major employment centers: Pittsburgh: With the Pittsburgh labor market area bearing the brunt of the steel strike demand in the selected occupations has dropped considerably. . . . Baltimore: Steel work stoppage resulted in layoffs of draftsmen. . . . From Indianapolis on the other hand: Despite production curtailment as steel supplies dwindled, new orders were being received at the usual rate for industrial and mechanical engineers, chemists, and draftsmen. . . . While from Buffalo: Significant that very few orders received in September for specified occupations. Perhaps management is deferring hiring because of steel strike. . .in a similar vein, from Louisville: It is likely that additional needs for mechanical and industrial engineers will develop if the steel dispute is settled soon and metalworking employees can make firm plans. . . .and from San Francisco-Oakland: Settlement of the steel strike will bring to light additional job opportunities in several of the engineering classifications. . . . But from Cleveland: The steel strike has not affected these occupations.

COLLEGE RECRUITMENT FORECAST: More jobs were listed in 1959 with the University of California placement service than there were candidates available for referral. A number of firms did not fill their quota through campus recruiting so that this backlog of openings should increase opportunities for 1960 graduates.

OTHER TRENDS IN THE MAKING: Research centers are being expanded and developed in several major labor market areas. Boston: A number of additional laboratories have located here in the past two months which will tend to make demands for these specialized personnel even heavier than they have been. The newest research facility to begin operations will conduct studies in astrodynamics. . . . Another development is the further enlargement of the research and development laboratories of a large air force base. . . . Philadelphia: Expansion in firms producing servo and synchro components for missiles and rockets, radar systems computers, and gun control equipment will necessitate substantial additions to engineering staffs. . . . Pittsburgh: New laboratories opening here will center research on radiation and chemical hygiene. . . . St. Louis: A major chemical producer is developing plans for a centralized research center.

PROFESSIONAL OFFICE NETWORK RECRUITING: From New York City: Two out-of-State employers enlisted the aid of the New York State Employment Service to fill openings. One firm wished to hire 400 engineers and physicists during the next few months and the other has openings for electronic engineers.

COLLEGES INFLUENCE PLANT LOCATIONS: One of the principal reasons for the growing concentration in the Boston area of space age laboratories concerned with both pure research and the practical application of newly discovered scientific facts is the availability of consultants on the staff of the Massachusetts Institute of Technology and Harvard. The stimulating, idea-generating atmosphere draws scientists to work and live in the area. Excellent opportunities for advanced studies are also attractive inducements. . . . Another great cluster of high technology firms is found in southern California, drawn by the California Institute of Technology.

DIFFICULTIES IN MATCHING APPLICANTS WITH JOB OPENINGS: The most significant factor in the inability to fill jobs on hand is lack of qualifications. A minimum hiring prerequisite for engineering and scientific jobs is a college degree. Yet many applicants do not meet this minimum requirement. Providence: 35 percent of engineers in local office active files did not have a college degree, much less the Master's degree that a number of employer orders have been specifying. . . . Columbus: Two-fifths of the engineering applicants seeking employment through the Columbus local office are without college degrees. . . . Los Angeles-Long Beach: Of the 490 applications filed by engineers, less than 47 out of every 100 indicated a college degree of any kind. . . . In contrast with these, New Orleans: Some 84 percent of the engineering applicants were college graduates.

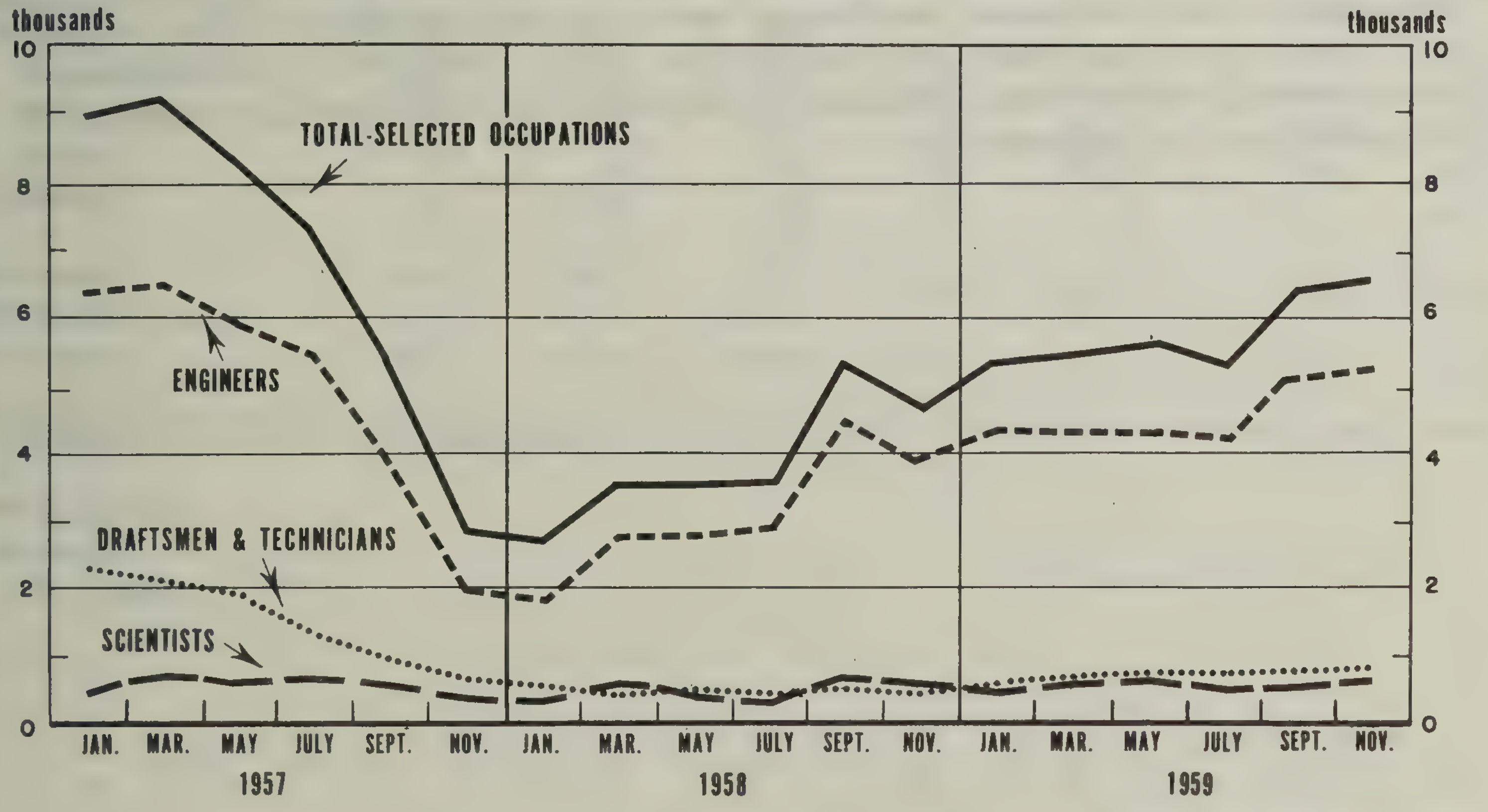
THE OUTLOOK: Some major labor market area forecasts. . . . Buffalo: Rebounding of durable goods and chemicals production and recovery of depressed plant and equipment expenditures program will stimulate demands for engineers and chemists as well as for ancillary workers such as draftsmen and technicians. . . . Paterson: Further shrinkage in the supply of workers in the selected occupational group is looked for in the coming months. Until after the first of the year, needs will be mostly for the production of electronic equipment and research services. . . . San Francisco-Oakland: The outlook in the selected occupations is mixed. Seasonal contraction in the construction and food industries should bring about a larger available supply of civil engineers, draftsmen, and laboratory technicians. Labor needs of engineering-construction firms for design and drafting should ameliorate to some degree the seasonal let-down in the drafting occupations. Expansion predicted for the Peninsula electronics industry should sustain demand for mechanical and electronics engineers. Electronics firms are also expanding in the Pittsburg section of the area, and they will need a few additional electronics engineers. A steady new demand for help is expected to continue in activities related to nuclear research or the application of nuclear energy. . . . In contrast, some areas predict few changes. Cleveland: No great changes are expected in the next few months. . . . Milwaukee: The demand-supply relationship with respect to the selected occupations is not expected to change much during the next four months.

recent developments in INTERAREA RECRUITMENT

The upward trend of job openings in interarea clearance for the 18 selected engineering, scientific, and technical occupations continued into November but the pace of the advance slackened following the steel strike. Clearance listings in the selected classifications had an almost continuous climb since January 1958. The rise from January to November of 1958 was 85 percent. For the corresponding period of 1959, it was only 21 percent.

In this group of occupations, vacancies in November numbered 6,585, a rise of 4 percent from the two-month earlier level. While well above the levels prevailing throughout 1958, they were substantially less than the highs of 9,000 reported in the early months of 1957.

TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957-1959



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

Engineering vacancies, which accounted for four-fifths of all the openings in the selected occupations, rose by almost 100 from July to September. The advance was limited to three classifications of engineers: Electrical, mechanical, and industrial. The largest increases, numerically, were in listings for electrical and mechanical engineers to meet the needs of the missile industry in Colorado. On the downside, aeronautical engineers had the largest loss of job opportunities when contract cancellations resulted in the withdrawal of listings by firms in California and Oklahoma.

The added demand for electrical engineers intensified the existing large shortage in this group. Public employment offices listed 2,725 electrical engineering job openings in November, a rise of 170 over September. The dominant position of this group of engineers in all engineering openings has been increasing. Its proportion of all engineering vacancies rose to 53 percent in November 1959 from 50 percent in September and from 40 percent in November a year earlier.

Relatively sharp advances in job opportunities were also recorded in selected science occupations, particularly for physicists, between September and November. Many were needed by the communication industry in California for work on guidance and control systems for various missiles.

Vacancies for draftsmen rose from 550 in September to over 600 in November. The November shortages were two and one-half times as great as a year ago, but were well below the heavy needs of early 1957. Clearance listings for laboratory technicians continued the same in November as in September.

Number of Nonagricultural Job Openings in Selected Occupations in Interarea Clearance at Public Employment Offices, U. S. Total, November 1958, September 1959, and November 1958

Selected Occupations	Job Openings			Change to November 1959 from:			
				Sept. 1959		Nov. 1958	
	Nov. P/ 1959	Sept. R/ 1959	Nov. 1958	Number	Percent	Number	Percent
All Selected Occupations	6,585	6,320	4,789	+265	+4.2	+1,796	+37.5
Engineers, total	5,193	5,096	3,906	+97	+1.9	+1,287	+32.9
Chemical	87	100	58	-13	-13.0	+29	+50.0
Civil	210	223	792	-10	-5.8	-582	-73.5
Electrical	2,727	2,558	1,570	+169	+6.6	+1,157	+73.7
Industrial	388	335	172	+53	+15.8	+216	+15.8
Mechanical	1,094	979	909	+115	+11.7	+185	+20.4
Aeronautical	641	822	377	-181	-22.0	+264	+70.0
Selected Scientific Occupations	600	500	475	+100	+20.0	+125	+26.3
Natural Scientists	468	360	384	+108	+30.0	+84	+21.9
Physicists	240	162	194	+78	+48.1	+46	+23.7
Mathematicians	150	145	137	+5	+3.4	+13	+9.5
Other	78	53	53	+25	+47.2	+25	+47.2
Chemists	132	140	91	-8	-5.7	+41	+45.1
Draftsmen	616	548	243	+68	+12.4	+373	+153.5
Laboratory technicians	176	176	165	n.c.	n.c.	+11	+6.7

1/ Mechanical, except aeronautical.

P/ Preliminary
R/ Revised
n.c.--no change

CURRENT TRENDS IN LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

While the steel strike may have caused some postponement in hiring of engineers and, in at least one instance, resulted in layoffs of draftsmen, it did not halt the recruiting of engineers, scientists, and related technical personnel. A high level of activity in manufacturing and construction industries accounted in part for a drop in supply of job seekers. Other contributing factors were continued expansion in research and development projects such as missile guidance, atomic heating, and nuclear development, as well as widespread growth in electronic equipment manufacturing.

Recruitment of workers in these selected occupations was widespread geographically. Most of the major employment centers had fewer job seekers in the selected classifications in September than in July.

The supply in these occupations fell by nearly 15 percent from July to September, but the improved demand was not fully reflected in the operating statistics of the public employment offices. Job openings received and openings unfilled at the end of the month rose only slightly from July to September.

The most active demand for engineers occurred in the electronics category. Among the natural scientists, the largest needs were for mathematicians and physicists. Chemists with advanced degrees were in short supply. Among draftsmen, the need was for those with specialized experience in architectural, heating and ventilating fields. The greatest shortage among laboratory technicians was for medical technicians who were college trained and registered.

ENGINEERS

The late summer and early fall months witnessed improving job opportunities for engineers and a diminishing supply of these workers. This improvement was reflected in expansion in research and developments projects, in a continuing high level of employment in manufacturing industries employing engineers, and in the virtually full employment of all recent engineering graduates. At least at one university placement center--University of California Placement Center--more jobs were listed than candidates were available for referral.

The high level of economic activity was reflected in geographically widespread declines in the supply of engineers. Two-thirds of the major employment centers reporting detailed information on engineers and other selected occupations had fewer job seekers at public employment offices for engineering positions in September than in July. If small changes in the number of applicants are disregarded, i.e. less than 10, then 14 major areas had declines while only four showed an increased supply.

The largest declines took place in the Philadelphia and the Los Angeles-Long Beach labor market areas. Philadelphia had 105 fewer applications in September than in July. This was due in large measure to rising employment in the electrical machinery and non-electrical machinery industries. The Los Angeles-Long Beach area attributed a drop of 87 engineering job seekers to a high level of employment in durable goods and expansion in research and development projects. In contrast, the largest increase in supply (49 more applications) was in Baltimore, where layoffs in aircraft plants resulted in large registrations of mechanical and aeronautical engineers.

In the 30 major employment centers reporting, the number of engineers seeking jobs at public employment offices dropped by 450, or 10 percent, from July to 4,150 in September.

The drop in supply extended to all engineering classifications, except aeronautical. Overall totals, however, conceal divergent movements among the reporting areas. While the overall supply of civil engineers dropped, Boston reported that the number of job seekers in this category rose because of lack of work in professional engineering organizations in the construction field. But in the San Francisco-Oakland area and in New York City, job opportunities for civil engineers improved due to continued activity among construction firms.

Similarly, a rise in applications from aeronautical engineers in Baltimore reflected layoffs by an aircraft company there. However, in the Los Angeles-Long Beach area, the strong demand for aeronautical engineers reflected the continuing importance of aircraft manufacturing in that area.

Number of Engineering Job Applicants
September 1959, July 1958, and September 1958

Engineering Specialty	Active Applications			Change to Sept. 1959 from:			
				July 1959		Sept. 1958	
	Sept. 1959	July 1959	Sept. 1958	Number	Percent	Number	Percent
Engineers, total	4,166	4,619	7,782	-453	-9.8	-3,616	-46.5
Metallurgical	62	74	143	-12	-16.2	-81	-56.7
Chemical	294	336	624	-42	-12.5	-330	-52.9
Civil	826	918	1,108	-92	-10.0	-282	-25.5
Electrical	611	686	1,102	-75	-10.9	-491	-44.6
Industrial	737	831	1,570	-94	-11.3	-833	-53.1
Mechanical	1,493	1,641	3,035	-148	-9.0	-1,542	-50.8
Aeronautical	88	74	117	+14	+18.9	-29	-24.8
Mining	55	59	83	-4	-6.8	-28	-33.7

Demand for engineers at the national level, as indicated by the number of openings placed in interarea clearance, surged ahead in September For the first half of the year, these openings had fluctuated around the 4,300 level. But in September they climbed to 5,100. The largest numerical gain was in listings for electrical engineers, followed by industrial and mechanical. Clearance openings for civil engineers dropped sharply.

In the 30 major labor market areas the number of unfilled job openings placed in interarea clearance did not keep pace with the mounting national total. Clearance openings in the 30 areas edged up only slightly. However, although the total was unchanged, the listings for specific engineering classifications fluctuated markedly. Vacancies for electrical engineers jumped by 25 percent from July to September whereas those for civil, mechanical, and aeronautical engineers slumped.

Unfilled openings for engineers showed the same trend in the specific classifications from July to September as did clearance listings.

The upturn in demand for electrical engineers coupled with lessened need for mechanical and aeronautical engineers may indicate shifts in procurement. Changes in aircraft design from conventional to missiles and jets had reduced demands for mechanical and aeronautical engineers but has stimulated needs for electronics engineers. The widespread growth in electronic equipment manufacturing and in research and development projects is also boosting needs for electronics and electrical engineers.

The changes in the relative importance of demand for electrical and mechanical (including aeronautical) engineers is evidenced by the proportions that these two groups represented among all unfilled openings at the end of the month by public employment offices in 30 major labor market areas:

Month	Percent of Total Unfilled Openings	
	Electrical	Mechanical and Aeronautical
Sept. 1959	56	33
July 1959	43	41
May 1959	49	34
March 1959	44	39
Jan. 1959	41	36
Sept. 1958	40	38
July 1958	39	41

The demand for engineers has both qualitative and quantitative aspects. Applicants who have specialized experience as well as educational qualifications are usually required. The number of job seekers who met minimum educational requirements--a college degree--in September varied among the several specialties as follows:

Engineering Applicants
With College Degrees

Engineering Specialty	Percent of Applicants With Degree
All applicants	60
Metallurgical	73
Chemical	81
Civil	66
Electrical	56
Industrial	47
Mechanical	58
Aeronautical	51
Mining	87

Six out of ten engineering applicants in September had a college degree. The proportion varied from about half of the job seekers in industrial engineering to over 80 percent of those in chemical and mining engineering.

Area Trends

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month
at Public Employment Offices in 30 Major Labor Market Areas, September 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	
Summary, 30 Areas	4,166	4,619	7,782	4,197	4,302	3,540	Job market for engineers continued strong. Demand-supply relationship for the 30 areas combined tightened. Number of active applications dropped sharply although unfilled openings showed little change.
New England Region:							
Boston, Mass.	211	208	289	114	131	90	Seasonal layoffs of civil engineers in construction activities offset declines in applications from mechanical and industrial engineers. However, the most serious occupational shortages continue to be in fields of electrical and electronics engineering.
Providence, R. I.	43	52	80	1	6	7	Greatest need is for qualified mechanical and machine design engineers. Next greatest demand is for electrical, and to a lesser extent, electronics engineers.
Middle Atlantic Region:							
Buffalo, N. Y.	97	137	115	40	29	178	Demand-supply situation tightened; supply of applicants declined while unfilled openings rose. Shortages of electrical engineers, which disappeared in July, emerged again.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, September 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	
Middle Atlantic Region: Cont.							
New York, N. Y.	631	673	1,146	81	67	65	Improved opportunities for civil, electrical, and mechanical engineers did not appreciably reduce surpluses in these fields.
Newark, N. J.	176	168	558	153	60	26	Sharp upturn in orders for electrical engineers for research and development and for production of electronics and high frequency communication equipment.
Paterson, N. J.	91	113	235	70	107	41	Greatest need for electronics engineers with highly specialized experience or training. Sixty of the unfilled openings were for electronics engineers.
Philadelphia, Pa.	347	452	448	17	133	65	Demand for electrical and electronics engineers continued at an accentuated pace over the past two months.
Pittsburgh, Pa.	231	243	402	33	54	21	Despite drop in openings received and unfilled openings, number of registrants declined.

Area Trends for Engineers

Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, September 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	
East N. Central Region:							
Cincinnati, Ohio	50	32	30	230	225	220	Severe shortages among engineers for electronic and aeronautic development; shortages in other engineering fields moderate.
Cleveland, Ohio	119	139	345	64	55	13	Demand-supply relationship for engineers tightened between July and September. The ratio of engineering job hunters to unfilled job openings was 1.9 to 1 in September; in July, 2.5 to 1; in September 1958, 26.5 to 1.
Columbus, Ohio	29	17	59	57	93	18	Largest demand among engineers was for aeronautical engineers.
Indianapolis, Ind.	15	18	44	24	31	12	No significant change.
Chicago, Ill.	227	268	437	162	153	50	Despite steel strike which directly and indirectly affected some engineering jobs, openings increased while the application file has continued to decrease.
Detroit, Mich.	273	280	804	5	9	19	No significant change.
Milwaukee, Wis.	112	113	189	333	331	143	No significant change.

Area Trends for Engineers

Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, September 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	
West N. Central Region: Cont.							
Minneapolis-St. Paul, Minn.	58	70	144	186	149	83	Number of engineering job hunters declined slightly from July to September, following a more rapid decline earlier this year. Applications from engineers numbered 146 in January, and 70 in July. Current file of 58 is lowest since September 1957 when 64 were registered in this area. Increase in unfilled openings were for electrical and mechanical engineers.
Kansas City, Mo.	22	26	42	6	6	8	No significant change.
St. Louis, Mo.	98	92	103	114	81	20	Step-up in missile program resulted in increased demand for engineers.
South Atlantic Region:							
Baltimore, Md.	59	10	94	94	106	44	Sharp rise in supply of engineers between July and September. Layoffs by aircraft company resulted in increase in number of applications from mechanical and aeronautical engineers. Some applications are from persons presently employed but seeking better jobs.
Washington, D. C.	115	124	99	78	90	373	Labor demand-supply relationship eased slightly since July.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, September 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	
South Atlantic Region: Cont.							
Atlanta, Ga.	47	60	92	5	5	6	Supply of engineers dropped sharply between July and September.
East S. Central Region:							
Louisville, Ky.	16	16	44	10	6	4	No significant change.
West S. Central Region:							
New Orleans, La.	32	70	58	5	6	3	Applications dropped sharply in all occupations with heaviest loss in engineering group. Reasons: Some applicants failed to maintain contact with local office within validity period; some withdrew from labor force to return to school; others secured employment outside the area.
Dallas, Texas	61	110	90	100	73	213	Nature of demand for engineers shifted. Need for mechanical and aeronautical engineers declined and some applicants left area for employment in other aircraft centers. Electrical engineers, however, in increased demand due partly to shift in emphasis by local aircraft manufacturing activities from mechanical to electrical; and partly to growth of other electrical and electronic equipment manufacturing.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, September 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	Julyy 1959	Sept. 1958	
West S. Central Region: Cont.							
Houston, Texas	105	98	194	14	15	15	No significant change.
Mountain Region:							
Denver, Colorado	97	125	132	113	330	131	Unfilled openings dropped sharply, mainly because of withdrawal of listings for mechanical and aeronautical engineers. However, overall demand still exceeds available supply.
Pacific Region:							
Seattle, Wash.	76	59	30	1,018	903	888	Supply of engineers rose, largely due to increase in applications from mechanical engineers. The upturn resulted from job dislocations stemming from labor-management disputes in the fabricated metal and machinery industries and from changes in employment requirements by a major aircraft firm. Demand was also up. Expanding missile and spaceship programs of a major airplane producer resulted in sharp upturn in openings for electrical engineers, which offset cancellations in listings for civil, mechanical, and aeronautical engineers.

Area Trends for Engineers
Number of Active Applications and Unfilled Openings at End of Month at Public Employment Offices in 30 Major Labor Market Areas, September 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	
Pacific Region: Cont.							
Portland, Oreg.	48	50	56	23	26	11	Little overall change, but some compensating fluctuations. Supply of civil engineers dwindled as placements were made to fill order of the U. S. Forest Service. Meanwhile, supply of mechanical engineers increased.
Los Angeles-Long Beach, Calif.	490	577	1,095	1,013	983	742	High level employment in durable goods manufacturing and expansion in research and development projects sustained demands in engineering classifications for past 60 days. Need for such workers has consistently exceeded local supply.
San Francisco-Oakland, Calif.	190	219	328	24	39	31	Drop in registrations over past 60 days represented improvement in civil engineering job opportunities.

NATURAL SCIENTISTS

The supply of natural scientists, as indicated by applicants at local public employment offices, eased slightly between July and September in 30 major labor market areas providing detailed information on these occupations. The decline, however, was less severe than for engineers. One area, San Francisco-Oakland, where supply eased slightly, noted that the decline was caused by some of July's job seekers either finding jobs or returning to school. However, recent graduates and inmigrants prevented the total from showing much attrition.

The largest number of applicants was reported in New York, where 115 were registered in September. Other areas reporting between 50 and 100 were Los Angeles-Long Beach and Washington, D. C. The Washington, D. C. area is regarded as a good recruitment area for men in the science field.

The demand-supply balance in this group of occupations is indicated by the ratio of active applicants to unfilled job openings in public employment offices. At the end of September, there were 2 registrants for each unfilled job as compared with a 2½ to 1 ratio for July.

Openings for mathematicians and physicists accounted for the bulk of the natural scientists shortages. These workers were being recruited for aeronautic, electronic, and nuclear development work in Cincinnati and for research and development work on missile guidance and atomic heating in Milwaukee. But in contrast to these areas with marked shortages, some areas, such as Denver and Portland, indicated only a limited need for natural scientists.

In the Boston area, a serious shortage of physicists led a nuclear laboratory which had been expanding rapidly to try unique recruiting advertising in European scientific magazines. This organization reputedly was able to round out its staff by hiring scientists from foreign countries.

A shortage of workers in supporting occupations related to science and engineering is becoming increasingly troublesome and is preventing the rounding out of research teams. Boston reports the following are in this category: Technical writers, technical illustrators, experimental and research machinists, instrument makers and machine set-up maintenance men, model makers, test technicians, and individuals to take care of animals in laboratories and operate electronic recording equipment.

CHEMISTS

The outlook for chemists improved markedly between July and September. This is evidenced not only by a declining supply of applicants at local public employment offices but also in sharp upturns in job openings received and openings unfilled at the end of the month.

The improvement is also reflected in the ratio of applicants to unfilled job openings. It fell to 3.7 to 1 for September from 5.3 to 1 for July. A year ago there were 10 applicants for each unfilled job.

The American Chemical Society's annual survey of starting salaries paid to recent graduates in chemistry and chemical engineering also mirrors the betterment in the job market. "These students are having little difficulty finding positions. . . .Less than 10 respondents out of some 2,800 reported that they had been unable to locate employment."

Specific indications of the labor market for chemists are revealed in several area comments. Cincinnati stated that a definite shortage of chemists exists in the area. In Cleveland, employers were still experiencing difficulties in recruiting chemists with advanced degrees. The San Francisco-Oakland labor market area had a fairly active labor market for chemists which was helped by peak seasonal labor needs at food processing firms and at certain chemical plants. In contrast to these, limited job opportunities were reported in New York City, Denver, and Portland.

DRAFTSMEN

A favorable business climate in many of the 30 major employment centers despite the steel strike helped the job market for draftsmen. The improved economy stimulated employment of draftsmen in Chicago and San Francisco-Oakland labor market areas. Increased employment as 1960 model production got under way in the automobile center of Detroit meant more jobs for draftsmen. In Cincinnati, metal working firms as well as firms engaged in aeronautic, electronic and nuclear development recruited draftsmen. However, draftsmen in Baltimore were hard hit by the steel work stoppage.

The high level of activity in these areas cut drastically into surpluses of draftsmen. Eight of the 30 areas reporting detailed information on these classifications had at least 50 fewer applications on file in September than in July. And of these areas, four had declines of 100 to 200 applications. In the 30 areas combined, the drop in applications from July to September exceeded 1,000 or 23 percent.

The upturn in demand for draftsmen is also indicated by openings received and unfilled at the end of the month. Job openings received climbed from about 530 in July to 800 in September while unfilled openings rose during this period from 770 to 955.

Nevertheless, there was still a surplus of draftsmen. Four job applicants were available for each unfilled job in September. But, in July there were six applicants for each job.

Some of the difficulty in filling jobs arose from special qualifications desired by employers. In Seattle, the positions called for two to nine years experience, mainly in the architectural and heating and ventilating fields, as well as some college training. Most of the applicants could not meet these requirements.

In Baltimore, employers wanted applicants to have a high school degree and drafting experience in specific technical fields such as electronics, structural building, or electrical and mechanical drawing. But, at times, the failure to fill jobs was due to other factors. Portland noted that its young registrants were job shopping while working. In Cleveland, employers were not interested in hiring women, who constituted one-third of the file of applicants. Also, male applicants were not interested in job-shop work, preferring more steady employment.

LABORATORY TECHNICIANS AND ASSISTANTS

Many of the 30 reporting metropolitan areas providing information on laboratory technicians and assistants reported a serious situation in regard to medical technicians. They are in short supply while demand is steady. Difficulties in recruitment arise partly from the job specifications: Applicants must not only be college trained but also registered technicians. But the supply of applicants has been curtailed because of low scales for positions in hospitals or medical fields.

The trend in the number of job seekers registered with public employment offices indicates a growing demand for laboratory technicians and assistants. In September 1958, almost 3,300 laboratory technicians and assistants were actively seeking work through public employment offices. This number fell to 2,800 in March 1959 and to 2,200 in September of this year. At the same time, the number of unfilled openings rose irregularly but steadily.

The demand for laboratory assistants and technicians over July was active in several metropolitan areas: Detroit, New York, Philadelphia, Pittsburgh, and San Francisco-Oakland. Seasonal activity in food canning and hiring at several laboratories sparked the demand on the West Coast.

In contrast to these areas, the supply of laboratory technicians and assistants in Boston rose as persons with a B.A. or B.S. degree in biology and chemistry sought laboratory work.

DIGEST

of related information

Chemical Survey: Job Market - Good; Salaries - Up

The American Chemical Society published the results of its survey of the June 1959 class of graduating chemists and chemical engineers. The data were obtained from departments of chemistry and chemical engineering approved by the ACS Committee on Professional Training. Results were secured from graduates of 233 of 270 approved departments of chemistry and 77 of 94 approved departments of chemical engineering. Some highlights of the report are:

1. Starting salaries for chemists and chemical engineers increased, on the average, 3 percent over a year earlier. A Ph.D graduate in chemistry received $700 a month in 1959, up from $675 in 1958. The median salary for masters in chemistry went up to $525 in 1959 from $511 in 1958. In chemical engineering, the median salary for inexperienced Ph.D graduates was up from $700 in 1958 to $725 in 1959.

2. Industrial employers offer the highest starting salaries and, accordingly, the greatest number of graduates accept such employment.

3. The chemical industry's great diversity and geographical spread provide an array of interesting positions in many areas throughout the U. S. Among the different locales, the Middle Atlantic States, the East North Central States, and the Pacific States attract the greatest numbers of chemists and chemical engineers.

4. The job market for chemists and chemical engineers is good. Students have little difficulty finding positions. Less than 10 respondents out of some 2,800 in the survey were unable to find jobs.

David A. H. Roethel
American Chemical Society
"Starting Salaries Move Up 3%"
Chemical and Engineering News
October 19, 1959

Convention Recruiting - Wasteful and Costly

Recruiting at professional conventions has become wasteful and costly says Edward Dear, western manager for Careers, Inc. At a recent Western Electronic Show and Convention, one personnel expert estimated that of the 20,000 or more in attendance, about 1,000 were recruiters for companies. Of the others present, about one-third were on hand primarily for the purpose of changing jobs. In addition to the company recruiters, the convention had "independent dealers in human brainpower." Through careful perusal of company brochures listing top research talent and supplementary information from alumni bulletins and other sources, these men built up a prospectus on likely candidates. With these data, they went to various companies saying a certain type of engineer could be produced. If the company displayed interest, the prospect was then approached. (The prospect had no prior knowledge of these proceedings.) The independent recruiter who could complete a placement received, as a fee from the company, 15 percent of the engineer's first year of pay. Mr. Dear estimated that "American firms in all fields are spending about $2 billion (sic) a year on recruitment. Most of these are defense firms. . ." Studies by Careers, Inc. indicate that a company must pay $1,000 to find each new engineer it hires.

New York Times, September 13, 1959
California Department of Employment
San Francisco-Oakland Labor Market
Report, September 1959

University of California Survey

The market for recent engineering and science graduates is evidenced by a survey made by the University of California placement center. It found that virtually all graduates who wanted work were employed. Of the graduating seniors finding employment and from whom information was available, 57 percent accepted jobs in aircraft, missile, and electronics plants. For electrical engineers, this percentage was 81 percent, the same proportion as in 1958; for mechanical engineers, 61 percent, as compared with 71 percent last year. For the master's and doctor's degree candidates from electrical and mechanical engineering, over 90 percent accepted positions with aircraft, missile, and electronics firms.

Salaries at which engineering graduates were hired indicate that aircraft and missile firms paid premium wages generally, while in all but two specialties, government paid less than the median. The following summary illustrates the fact that "glamour" fields have been helped considerably in their recruitment by offering the highest wages.

Salary Survey of 1959 Bachelor's Level Technical Graduates From the University of California (Salaries are Medians)

Major Field	Graduates in Survey		Graduates Hired by:					
			Aircraft & Missiles		Electronics		Government	
	No.	Sal.	No.	Sal	No.	Sal.	No.	Sal.
Engineering:								
Civil	86	$481[a]	2	$520	--	--	54	$481[a]
Electrical	135	545	36	550	68	$550	4	464
Industrial	31	500	1	508	9	500	1	373
Mechanical	115	515	47	525	12	520	5	413
Mineral tech. & eng. physics.	29	495	4	550	6	495	1	490
Chemical	35	500	7	500	3	480	1	510
Sciences:								
Chemistry & biochemistry	13	470	--	--	2	500	1	350
Biological	16	358	--	--	--	--	2	336
Geology & paleontology	11	442	--	--	--	--	--	--
Physics	22	515	9	520	3	520	2	452
Mathematics & statistics	11	500	4	505	1	570	1	450

[a] Mid-June figure. On July 1, 1959, the State of California raised the starting salary of junior civil engineers to $505.

Placement Center, University of California, "Summary of Engineering Placement Activities, 1958-1959," September 1, 1959. Quoted in California Department of Employment, San Francisco-Oakland Labor Market Report, September 1959.

First Jobs Survey

Donald C. Hunt, Director of Coordination and Placement of the University of Detroit, reports that 88 percent of the 1959 University of Detroit engineering graduates had accepted employment as of commencement date. This may be compared with 47 percent for commerce graduates and 55 percent in the arts and sciences. Three percent of the engineers were unemployed, six percent were entering graduate school, and three percent were heading for military service. Average starting salary was $525 for engineers compared to $421 for commerce, and $424 for arts and science. The survey showed that more than two-thirds of the engineer graduates chose their first job in line with a career plan.

Engineering Employment Practices
Newsletter
October 1959

College Recruiting Code

The American Society for Engineering Education has issued a code of recruiting practices for use by employers in recruiting college students. The code was developed as a result of the complaint that "certain recruitment practices have developed from time, in the stress of competition for engineering graduates, which have not been consistent with professional standards." The code is not binding but many companies are abiding by its standards.

Washington Post
November 3, 1959

Increase in Science and Mathematics Students

A recent report issued by the Office of Education, U. S. Department of Health, Education, and Welfare indicates future increases in manpower in the fields of science and mathematics. This was the second nationwide survey of resident junior-year college students majoring in science or mathematics.

The number of junior-year majors in these fields increased by 10.4 percent from the fall of 1957 to the fall of 1958. This percentage increase is almost three times as large as the percentage increase of junior-year students in all fields. A particularly large increase of 31 percent was reported for mathematics majors.

The 55,777 junior-year science and mathematics majors in the fall of 1958 constituted 13.8 percent of all resident junior-year students. If junior-year engineering students are added to these students majoring in science or mathematics, the total represents about one-fourth of all junior-year students. Because only one-fifth of the science and mathematics majors were women, approximately one-third of all junior-year men were majoring in engineering, science, or mathematics.

The number of bachelor's degrees conferred in science and mathematics in 1957-58 was 37,315. Assuming that the number in 1959-60 will be 80 to 85 percent of the junior year students majoring in these fields in the fall of 1958, the number of bachelor's degrees in science and mathematics to be granted in 1959-60 is estimated at 45,000--a rise of 20 percent from 1957-1958.

Junior-Year Science and Mathematics Students, Fall 1958
U. S. Department of Health, Education, and Welfare

Trend in First-Year Technician Enrollments

According to a survey conducted by the Engineering Manpower Commission, first-year enrollments in technical institutes of less than baccalaureate level increased by a substantially smaller amount in 1958 than in 1957. The increase of 1957 enrollments over 1956 was 10.2 percent while in 1958 the increase was only 1.2 percent. This decline corresponds to a similar decline in freshman engineering enrollments in four year colleges and universities. In 1957, there was an increase of 1.3 percent while in 1958 enrollments decreased by 11.1 percent. It was first believed that the decrease in enrollments in colleges and universities might be due to more students attending technical institutes but this recent survey reveals that first-year classes at both levels of education were affected in the same way. The survey of technical institutes included only those schools accredited by the Engineers Council for Professional Development.

Trends in Technical Institute Enrollment
Engineering Manpower Commission

High Demand for Engineers Forecast

It is estimated that the demand will be high for next year's engineering graduates. James E. Clifford, College Relations Administrator for Vitro Laboratories in Silver Spring, Maryland, said he expects a "highly competitive bidding market" for the 1960 graduates. Robert W. Reilly, George Washington University placement officer, says that next year will be the best year ever for engineering graduates. He expects this high demand to lap over into other fields but there remains a lag between engineering and science, and other fields, particularly in liberal arts.

Washington Post
November 3, 1959

Project Engineers Leaders Needed

According to Herbert Halbrecht, President of Herbert Halbrecht Associates, "there is an increasing demand for project and group leader engineers, as well as engineering supervisors and managers. These are at the $10,000-15,000 levels generally, with a rather noticeable increase in the $12,000-and-up range." Reasons for this increased demand include:

- Only few technically competent engineers have the managerial ability to administer budgets, lead and supervise men, plan and forecast for the future and generally act as management personnel.
- There is a tremendous turnover of engineers at the $8,000-15,000 level.
- Many of the men who aspire to management positions have never had the training they ought to have for such jobs.

Space/Aeronautics
July 1959

Engineering Needs

Harold A. Mosher, President of the National Society of Professional Engineers, says that we should not panic at Soviet Premier Krushchev's recent boast that Russia is turning out three times as many engineers as the United States. Mosher warns that "the near-hysteria of emphasis on numbers of engineering graduates which followed Sputnik I could easily be renewed if we are not careful in our appraisal of the Soviet statement. It would be a disservice to our defense efforts to play up numbers at the sacrifice of the much more important emphasis on quality." Mosher suggested that our primary needs are at the poles of the engineering force. We need more advanced knowledge acquired through graduate study and more technicians to support the professional force by relieving them of the less creative and more routine work.

Engineering Employment Practices
Newsletter
October 1959

Conserving Engineering Manpower

Dr. William G. Torpey, Office of Civil and Defense Mobilization, made the following suggestions for conserving engineering manpower in a speech before the American Institute of Chemical Engineers:

1. Use of position guides. A detailed job description for each scientific and engineering position should be developed.

2. Engineering apprentice program. Technicians can be trained with the objective that they will ultimately become professional engineers.

3. Design work. Student assistants may be used for drafting work in order to free the engineer for professional duties.

4. Use of computers. Professional time may be conserved through the use of computers.

5. Tuition refund program. Provides advanced knowledge for optimum performance by scientific and engineering employees.

6. Upward communication. All obstacles to the upward flow of information should be cleared away.

7. Encouragement to publish technical papers. Technical publication committees can be formed to provide encouragement and coordination.

8. Employer assistance to publish technical books. Legal, stenographic, and manuscript preparation services may be provided by the company.

9. Pre-selection of technical material. Technical material may be predigested and "spoon-fed" to professional employees. This preselection can often be performed by non-technical personnel.

10. Recognition. Equitable recognition for superior work is necessary for good morale and efficiency.

Chemical Engineering Progress
April 1959

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is the Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas [1] for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

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[1] The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 26.

List of 30 Major Labor Market Areas by Regions

New England:

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Newark, New Jersey
Paterson, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Indianapolis, Indiana
Chicago, Illinois
Detroit, Michigan
Milwaukee, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
Kansas City, Missouri
St. Louis, Missouri

South Atlantic:

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Dallas, Texas
Houston, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-November 1959

Month and Year	All Occupations	Professional & Managerial	Selected Occupations 1/				
			Total	Engineers	Scientific	Draftsmen	Technicians
Jan. 1956	27,887	12,845	6,803	4,792	435	1,361	215
Jan. 1957	35,629	14,498	8,993	6,349	389	1,988	267
March	34,390	15,952	9,300	6,428	732	1,851	289
May	31,452	14,007	8,404	5,976	576	1,591	261
July	29,144	11,879	7,407	5,437	590	1,174	206
Sept.	23,208	8,986	5,480	3,946	569	791	174
Nov.	13,859	5,388	2,879	1,993	294	384	208
Jan. 1958	14,665	7,726	2,582	1,817	245	315	205
March	14,451	8,244	3,496	2,717	398	204	177
May	15,552	9,439	3,505	2,764	330	244	167
July	14,420	7,514	3,540	2,921	233	212	174
Sept.	15,363	8,732	5,303	4,447	431	255	170
Nov.	17,661	9,308	4,789	3,906	475	243	165
Jan. 1959	16,042	10,530	5,426	4,386	489	377	174
March	17,960	10,820	5,473	4,278	576	391	228
May	23,232	12,828	5,635	4,387	602	402	244
July	20,559	10,112	5,315	4,128	486	495	206
Sept. R/	21,414	10,140	6,320	5,096	500	548	176
Nov. P/	21,101	11,740	6,585	5,193	600	616	176

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

R/ Revised
P/ Preliminary

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Table II. Clearance Openings in Selected Occupations 1/ September 1959, July 1959, and September 1958

Occupation	Sept. 1959	July 1959	Sept. 1958	Percent Change to Sept. 1959 from: July 1959	Percent Change to Sept. 1959 from: Sept. 1958	Percentage Distribution Sept. 1959
All selected occupations	6,320	5,315	5,303	+18.9	+19.2	100.0
Professional						
Engineers, total	5,096	4,128	4,447	+23.4	+14.6	80.6
Metallurgical	77	48	22	+60.4	+250.0	1.2
Chemical	100	89	54	+12.4	+85.2	1.6
Civil	223	357	799	-37.5	-72.1	3.5
Electrical	2,558	1,947	1,750	+31.4	+46.2	40.5
Industrial	335	150	156	+123.3	+114.7	5.3
Mechanical (exc. aero.)	979	810	1,033	+20.9	-5.2	15.5
Aeronautical	822	721	633	+14.0	+29.9	13.0
Mining	2	6	0	a/	a/	b/
Other professional	500	486	431	+2.9	+16.0	7.9
Natural scientists	360	368	352	-1.9	+2.6	5.7
Physicists	162	156	156	+3.8	+3.8	2.6
Mathematicians	145	160	163	-9.4	-11.0	2.3
Statisticians	4	2	4	a/	a/	0.1
Life scientists	47	44	24	a/	a/	0.7
Earth scientists	2	6	5	a/	a/	b/
Chemists	140	118	79	+18.6	+77.2	2.2
Semiprofessional						
Draftsmen, total	548	495	255	+10.7	+114.9	8.7
Mechanical	261	248	62	+5.2	+320.9	4.1
Other	287	247	193	+16.2	+48.7	4.5
Laboratory technicians and assistants, total	176	206	170	-14.6	+3.5	2.8
Medical technicians	116	151	118	-23.2	-1.7	1.8

a/ Percent change not shown where both absolutes are less than 50.

b/ Less than 0.05 percent.

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, September and July 1959, and September 1958

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958
Total	786	852	1,139	699	740	911	3,454	4,486	8,276	2,170	2,463	3,260
Boston	50	42	55	26	37	51	149	199	193	132	95	142
Providence	7	8	15	7	2	5	24	27	49	23	16	52
Buffalo	20	16	20	11	16	8	67	90	90	55	53	60
New York	208	246	311	115	141	200	597	728	1,136	376	446	414
Newark	51	47	111	29	33	66	99	135	410	99	107	289
Paterson	12	15	37	3	3	18	51	59	199	45	32	97
Philadelphia	46	35	52	30	36	26	366	505	569	182	229	233
Pittsburgh	27	36	36	32	26	27	298	489	638	146	255	353
Cincinnati	12	7	7	9	3	0	46	30	31	44	36	39
Cleveland	15	21	38	10	10	13	88	168	575	53	44	154
Columbus	1	1	13	2	0	10	18	21	67	21	11	43
Indianapolis	1	3	5	1	2	4	8	18	64	13	16	30
Chicago	52	50	72	19	18	48	156	240	474	104	98	138
Detroit	22	27	30	25	0	8	77	273	1,184	78	117	163
Milwaukee	18	21	26	18	23	27	13	11	119	11	15	49
Minneapolis-St. Paul	19	15	16	21	19	27	95	75	105	54	38	69
Kansas City	13	10	7	10	10	9	22	31	41	7	18	22
St. Louis	11	15	9	17	16	7	60	77	105	44	37	54
Baltimore	12	5	14	3	1	4	51	39	101	33	16	52
Washington, D. C.	32	43	31	66	63	45	67	69	73	40	53	57
Atlanta	5	18	8	4	15	6	33	40	45	28	27	41
Louisville	2	4	11	4	3	4	25	33	26	13	16	20
New Orleans	6	7	12	22	35	27	48	50	55	17	25	28
Dallas	2	9	9	19	25	28	47	67	84	26	31	38
Houston	24	30	24	39	30	64	99	104	292	48	49	80
Denver	7	27	14	43	54	24	38	55	72	45	67	36
Seattle	8	13	2	9	13	3	90	44	27	23	26	22
Portland	8	3	6	9	3	18	40	36	51	21	29	39
Los Angeles-Long Beach	70	58	91	62	64	88	467	543	1,010	258	270	249
San Francisco-Oakland	25	20	57	34	39	46	215	230	381	131	191	197

Table IV. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, End of Month, September and July 1959, and September 1958

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958	Sept. 1959	July 1959	Sept. 1958
Total	213	161	119	348	311	349	955	768	448	466	426	289
Boston	5	4	2	10	8	4	72	42	32	56	52	8
Providence	1	0	1	1	0	0	9	4	6	4	1	2
Buffalo	8	7	4	9	6	15	8	17	10	15	27	20
New York	24	16	11	6	5	15	92	76	25	78	83	82
Newark	36	17	8	3	2	3	31	31	15	23	8	6
Paterson	2	1	2	1	3	0	18	21	10	23	14	4
Philadelphia	1	0	1	0	0	0	10	1	15	3	1	1
Pittsburgh	9	11	3	1	2	9	16	23	3	20	21	6
Cincinnati	5	4	12	5	4	7	4	10	8	9	4	6
Cleveland	5	8	6	4	6	0	32	21	6	11	8	14
Columbus	2	0	0	0	7	0	26	11	6	4	0	6
Indianapolis	1	1	0	3	2	2	5	5	3	4	2	2
Chicago	21	23	2	10	4	5	61	53	5	24	27	9
Detroit	0	1	0	1	0	0	9	4	25	1	1	1
Milwaukee	6	8	4	108	104	6	117	121	42	16	21	11
Minneapolis-St. Paul	21	16	10	10	10	2	43	27	23	14	24	11
Kansas City	0	0	1	0	0	0	2	6	16	2	7	2
St. Louis	7	1	1	3	0	2	23	12	4	14	11	7
Baltimore	1	0	0	1	2	1	45	5	4	5	1	5
Washington	6	5	2	35	23	54	8	5	3	37	28	24
Atlanta	0	0	0	0	0	0	7	5	2	1	1	0
Louisville	9	2	0	0	0	0	1	4	4	0	1	2
New Orleans	1	0	0	0	0	0	1	2	2	1	1	1
Dallas	1	2	24	5	1	2	7	12	7	1	1	2
Houston	1	1	2	0	2	0	9	13	2	1	1	0
Denver	2	1	0	4	9	4	14	38	3	4	31	1
Seattle	1	0	0	50	62	201	10	5	2	2	1	8
Portland	1	0	1	0	0	0	11	9	5	5	5	2
Los Angeles-Long Beach	28	26	19	73	48	16	237	168	142	63	19	38
San Francisco-Oakland	8	6	3	5	1	1	27	17	18	25	24	8

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CURRENT LABOR MARKET CONDITIONS in ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

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U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director

Washington 25, D. C.

CURRENT LABOR MARKET CONDITIONS
in
ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

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Washington 25, D. C.

Office of Program Review and Analysis

Louis Levine, Deputy Director, Bureau of Employment Security

This bimonthly report is prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It is based on field reports on current conditions in 30 major labor market areas, statistics on job openings for selected engineering, scientific and technical occupations placed in inter-area clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources.

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Trend Indicators

OUTLOOK FOR ENGINEERS IN THE 1960's: Expanding research and development expenditures during the 1960's will boost the needs for more engineers and scientists. By 1969, we will need, according to one estimate, 45 percent more scientists and engineers than we have today. The more immediate outlook is, in a number of major labor market areas, for increasing job opportunities. Paterson: In the early spring of 1960 most occupations in these fields are expected to be in greater demand. . . . Los Angeles-Long Beach: The rapid expansion in missiles and electronics programs indicates a continuing excellent job market for engineering personnel in these specialties Seattle: Aircraft and missiles operations in 1960 will require from 1,000 to 2,000 additional engineers and scientists. . . . Boston: The total number of engineers and scientists needed locally has been tentatively estimated to be at least more than 3,000 over the next six months.

UNIVERSITY RECRUITMENT: The employment market for next June's graduates is promising. . . . Pittsburgh notes that engineering schools are expecting heavy competition among employers for the June graduating classes as early interviewing arrangements are being scheduled. . . . Houston observes that Rice Institute graduates are usually "spoken for" before graduation.

RECRUITING WOMEN FOR ENGINEERING AND SCIENTIFIC JOBS: Engineering and scientific occupations have generally been considered a man's realm. Few women were trained in these fields. They comprised less than one percent of the engineering graduates in 1957-58. Of the first-level degrees conferred in the physical and biological sciences, women received 12 and 22 percent, respectively. Yet their acceptance in the labor market is growing. Employers are relaxing their specifications and recruiting women for jobs in these fields. Boston reports: New recruitment advertising is being specifically directed toward women physicists, engineers, engineering aids, and similar occupations long considered exclusively male. . . . Newark: The great majority of job opportunities are for men. Openings for women do exist, however, as chemist, laboratory technician and assistant, natural scientist, and in some engineering classifications. . . . and San Francisco-Oakland: Some easing is occurring in the more rigid of employer specifications. A few openings were received for women draftsmen in the past few months whereas in the preceding quarter no jobs for women draftsmen had been received.

THE TECHNICAL RECRUITER--A NEW OCCUPATION: Boston reports that the search for scientific and engineering personnel has produced a new occupation over the past years--the technical recruiter. This new job has also joined the ranks of the shortage occupations almost upon its inception. Half technical and half personnel man, the job requires touring the nation, in a task force, seeking qualified personnel wherever they may be found, from the universities to the laboratories. Some of the vacancies for professional recruiters require a bachelor's degree in engineering, mathematics or physics as well as experience in personnel administration.

OTHER DEVELOPMENTS: Small research centers are being opened in the Boston metropolitan area when out-of-area and out-of-State companies cannot induce resident engineers and physicists, mathematicians, and other technical workers to leave the area. . . . Research firms have set up their own separate manufacturing corporations to produce the new equipment and instruments used in scientific explorations. . . . Centers of medical research and treatment have recruiting problems. The medical center in Houston has created an urgent need for all professions in the medical field. Boston reports that shortages of interns, resident physicians, as well as staff men, are desperate and that the supply-demand situation will further deteriorate in July 1960 when a new law licensing foreign physicians serving in the United States may severely limit the number of foreign doctors able to qualify to enter this country. Engineers and technicians with specialized experience in medical electronics are urgently needed.

JOB CHANGING: Job dissatisfaction, not more money, is the primary reason engineers and scientists change jobs. Personnel men reached this agreement at a panel discussion of the Northeast Electronics and Radio Association meetings held recently in Boston. The employment characteristics of job applicants at public employment offices afford some indication as to the extent of job changing in these occupations. Providence: Applicants in November for industrial and mechanical engineering jobs were mainly seeking job information as they were employed elsewhere; only a few were unemployed. . . . Boston: An appreciable number of applications are filed by individuals already employed but who are seeking other jobs. . . . Milwaukee: Roughly 40 percent of the engineering applicants are employed currently, but are requesting a change in employers. . . . New Orleans: The increase in applications from two months ago occurred mainly in the engineers' group and was due to employed applicants formerly registered with the Employment Service, who reactivated their applications as an avenue for better jobs in their chosen fields. . . . Portland: Many of the new registrants are currently working while seeking better opportunities.

DEFENSE CUTBACKS PRODUCE NO SURPLUS OF ENGINEERS: Engineers and scientists have been little affected by cutbacks in defense awards. In Cincinnati, shop employees were the first to be laid off. While it is expected that engineers and technicians will be released, no difficulties in placing them are foreseen. . . . When an aircraft company in the Los Angeles-Long Beach area released 60 engineers, another firm which was recruiting such workers wrote individual letters to each person relative to an interview for employment. Of the 60 engineers contacted, only two responded and came in for an interview.

recent developments in

INTERAREA RECRUITMENT

Job openings in interarea clearance in engineering, scientific, and technical occupations dropped sharply from November to January. This marked the second bimonthly downturn in these selected occupational shortages since the beginning of 1959. The earlier decline, in July, was relatively modest, and extended to all the selected groups except draftsmen. The decline in January was proportionately greater and, unlike the previous one, was concentrated almost entirely in engineering occupations (see chart and table).

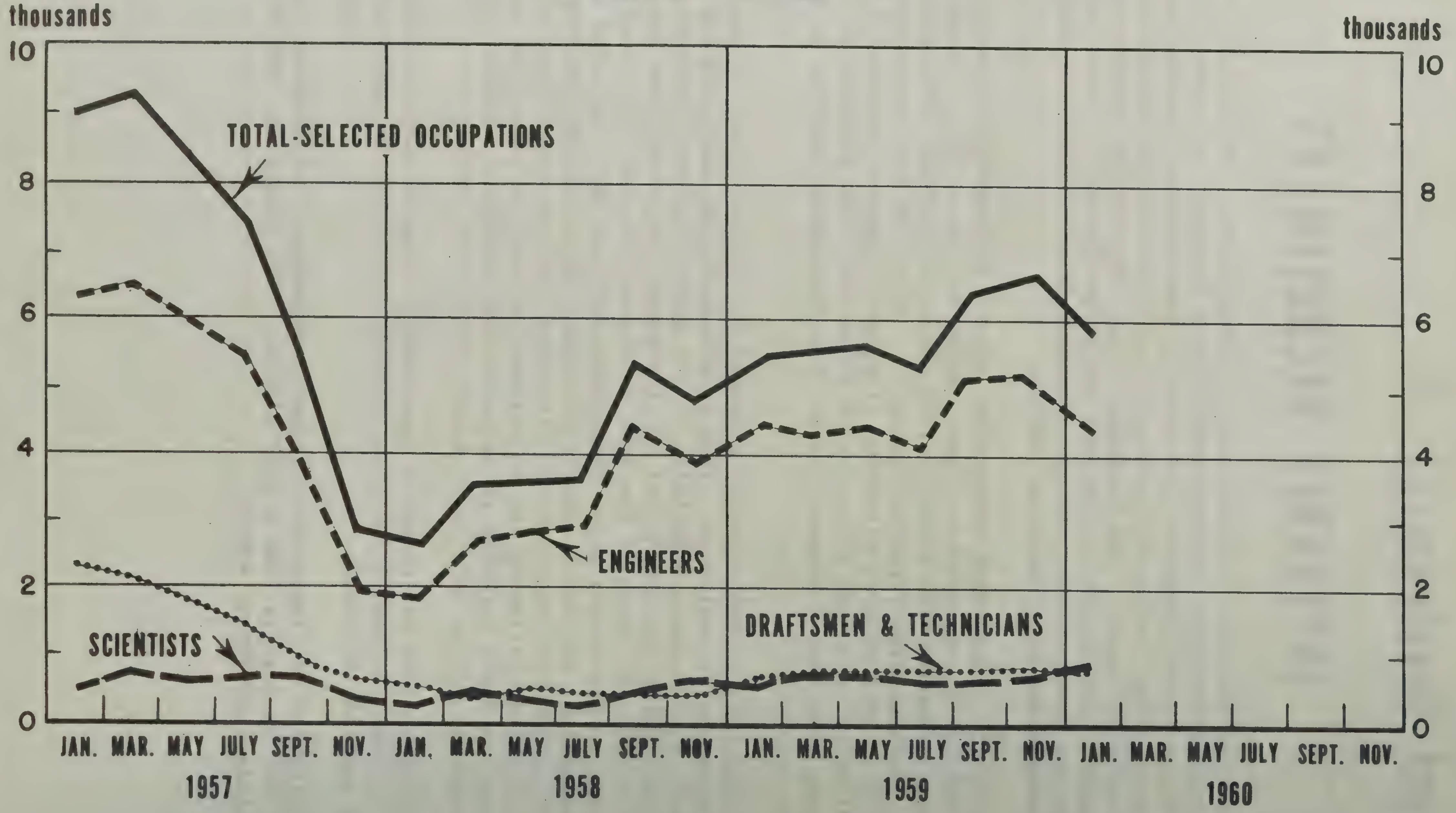
Vacancies in engineering occupations placed in interarea clearance by local public employment offices, which had hit a high of 5,200 in November, dropped back to early 1959 levels in January 1960, when 4,400 listings were reported (Table 1). In all of the occupations covered in this report, clearance listings in January numbered 5,800, a decline of less than 800 or about 12 percent from November to January. However, they were 7 percent higher than the number reported in January 1959.

More than half of the cutback in demand for engineers was in vacancies for aeronautical engineers. This is attributed to sharp slashes in aircraft procurement, especially in the major California production centers. Needs for electrical and industrial engineers were also greatly reduced. Much of the loss in demand for electrical engineers occurred in New Jersey where widespread declines were indicated for communications equipment, electrical repairing, radio and television, and for government employment. Clearance listings for industrial engineers declined following the recruitment of such personnel for a major producer in North Carolina of telephone and telegraph apparatus by the professional office network of public employment offices.

Job opportunities for chemists rose sharply from November to January but for other natural scientists, such as physicists and mathematicians, there was little change.

Vacancies for draftsmen were virtually unchanged from November to January, but up sharply from a year earlier. The demand for laboratory technicians continued stable.

TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957-1960



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

Number of Nonagricultural Job Openings in Selected Occupations in Interarea Clearance at Public Employment Offices, U. S. Total, January 1960, November 1959, and January 1959

Selected Occupations	Job Openings			Change to January 1960 from:			
				Nov. 1959		Jan. 1959	
	Jan. 1960	Nov. 1959	Jan. 1959	Number	Percent	Number	Percent
All Selected Occupations	5,817	6,585	5,426	-768	-11.7	/391	/7.2
Engineers, total	4,389	5,193	4,386	-804	-15.5	/3	/0.1
Chemical	98	87	87	/11	/12.6	/11	/12.6
Civil	218	210	676	/8	/3.8	-458	-67.8
Electrical	2,532	2,727	1,746	-195	-7.2	/786	/45.0
Industrial	225	388	179	-163	-42.0	/46	/25.7
Mechanical	1,055	1,094	937	-39	-3.6	/118	/12.6
Aeronautical	216	641	722	-425	-66.3	-506	-70.1
Selected Scientific Occupations	648	600	489	/48	/8.0	/159	/32.5
Natural Scientists	468	468	400	n.c.	n.c.	/68	/17.0
Physicists	234	240	177	-6	-2.5	/57	/32.2
Mathematicians	159	150	161	/9	/6.0	-2	-1.3
Other	75	78	62	-3	-3.9	/13	/21.0
Chemists	180	132	89	/48	/36.4	/91	/102.2
Draftsmen	605	616	377	-11	-0.2	/228	/60.5
Laboratory technicians	175	176	174	-1	-0.1	/1	/0.6

1/ Mechanical, except aeronautical.

n.c.--no change

CURRENT TRENDS IN LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

Several conflicting developments dominated the labor market for engineers, scientists, and technical personnel as 1959 drew to a close, but the evidence pointed to November as the peak period in a year of increasing job opportunities in these occupations.

Seasonal declines in construction and cutbacks in aircraft procurement resulted in layoffs of engineers, scientists and draftsmen. But most of the qualified able applicants encountered no difficulty in locating other jobs. A brisk demand stemmed from new or enlarged laboratories for research and development in space-age problems, expansion in electronics manufacturing, and improvement in durable goods manufacturing. Partly as a consequence, the supply of applicants registered at public employment offices in these occupations reached a low for the year of 10,850 in November, off by 400 or 4 percent from September and 40 percent less than the number in November 1958.

The most active demand among engineers was for electrical engineers. The need for aeronautical engineers was cut drastically with the retrenchments in aircraft so that, in the 30 reporting areas, their proportion of unfilled openings to total dropped to 4 percent in November from 13 percent in September. Natural scientists, especially mathematicians and physicists continued in short supply as did medical technologists.

The job market for chemists continued to improve, especially for applicants with advanced degrees. Areas which a few months ago were reporting a surplus of chemists now indicated that qualified persons in specified fields were being actively recruited.

Applicant files for draftsmen had the largest numerical decline of the selected occupations from September to November. Offsetting increases arising from seasonal layoffs in construction and from cutbacks in aircraft were declines due to hiring by architectural and engineering firms and by companies engaged in durable goods production.

ENGINEERS

The labor market for engineers continued to improve all through 1959, and at its close was extremely favorable for them. Indicative of the excellent job market is the supply-demand relationship in these occupations. In November there was one applicant to each unfilled job as compared with two applicants a year earlier.

The excellent job market for engineers at the end of 1959 was achieved despite the fact that it occurred at a time when termination of fall activities caused curtailments in staff levels of professional engineering firms in some areas. In others, cutbacks in defense procurement of aircraft, atomic-powered aircraft engines, and jet engines for new bombers and fighters meant not only a sharply reduced demand, but also some layoffs for engineers. These influences were offset, however, by other developments operating to expand job opportunities for these workers. These include an upturn in durable goods manufacturing, which was aided by the termination of the steel strike, and an expansion in activities of firms engaged in space-age research. These developments continued to demand and absorb engineering talent.

Employer and employee reaction to the tight labor market were marked. Employers relaxed rigid hiring specifications and, in some instances, began to recruit women engineers. Employees saw in the current market opportunities for job changing and advancements in their chosen fields. Many employed engineers were reported among the job applicants at the public employment offices.

In the 30 major areas reporting, the number of engineers seeking jobs at public employment offices slipped by 53 or 1.3 percent, from September to 4,110 in November. The moderate decline in the number of active applications from September to November extended to a bare majority of the areas providing detailed information on engineers. Of the 30 reporting areas, 17 had fewer job seekers for engineering positions in November than in September.

The Los Angeles-Long Beach area was particularly hard-hit by cutbacks in the aircraft industry and layoff of aeronautical engineers. Additional electrical engineers unwilling to move were temporarily out of jobs following transfer of two major electronics firms out of the area. In all, this area reported 113 more applications from engineers in November than in September. Increases in other areas were not so great. Columbus, which reported a doubling in registrations as the result of aircraft cancellation at North American Aviation, had only 37 more applicants in November than in September.

The Detroit and Chicago areas, with 59 and 53 fewer engineering registrants, respectively in November than in September, headed the areas with dwindling supplies of engineers. Detroit attributed its drop in supply to out-of-area recruitment of its surplus. The out-migration of engineers has progressed to a point where it is now necessary for Detroit employers to recruit engineers from outside the area in order to obtain men with specific qualifications. Chicago achieved a lessened supply of engineers despite a drop in the volume of new orders.

Number of Engineering Job Applicants
November 1959, September 1959, and November 1958

Engineering Specialty	Active Applications			Change to Nov. 1959 from:			
				Sept. 1959		Nov. 1958	
	Nov. 1959	Sept. 1959	Nov. 1958	Number	Percent	Number	Percent
Engineers, total	4,110	4,163	6,808	-53	-1.3	-2,698	-39.6
Metallurgical	58	63	114	-5	-7.9	-56	-49.1
Chemical	299	294	502	+5	+1.7	-203	-40.4
Civil	854	823	1,124	+31	+3.8	-270	-24.0
Electrical	604	609	925	-5	-0.8	-321	-34.7
Industrial	719	736	1,272	-17	-2.3	-553	-43.5
Mechanical (exc. aero.)	1,399	1,495	2,708	-96	-6.4	-1,309	-48.3
Aeronautical	133	88	106	+45	+51.1	+27	+25.5
Mining	44	55	57	-11	-20.0	-13	-22.8

The drop in supply in engineering job seekers extended to 5 of the 8 classifications shown in the above table. Within particular classifications, there were divergent movements. Thus, the increase in the number of aeronautical engineers seeking jobs reflects primarily the situation in the Los Angeles-Long Beach and Columbus areas. But in Baltimore, the supply was cut in half as a result of callbacks at the local aircraft plant. Seasonal contraction in construction, already noted, resulted in a surplus of civil engineers in November. But in St. Louis the supply dropped as a result of intensive pre-selection for construction of a new Federal building.

Mechanical engineers comprise the largest group among engineering job seekers, accounting for one-third of the applicants. They were widely sought and the number of registrations dropped by almost 100 in November from September. The variety of work which mechanical engineers do, is indicated to some extent by the purposes for which they were recruited. They were in demand in Milwaukee for research, design, and development work, and in Providence, for machine design work. San Francisco-Oakland reported a strong demand for these engineers with experience in heating, ventilating, and plumbing. In the Los Angeles-Long Beach area this group, together with electrical engineers, represented the primary occupations for intensive recruitment. The rapid expansion in missiles and electronics programs indicated a continuing excellent job market for engineering personnel in these specialties.

Although applications from electrical engineers showed little change between September and November, these people were the most widely sought of all engineering specialties. The fields for which they are in demand broadly cover the entire range of work of plasma physics, nuclear particle physics, cosmic rays, satellite instrumentation and hardware, pattern recognition and other types of communications theory; human factor sciences for advanced work on space exploration, satellites, hypersonic missiles, reentry vehicles, space platforms, defense and offense strategy planning, communication engineering, and other esoteric specialties.

Qualified electrical engineers continue to be in persistent demand. The number of unfilled openings for electrical engineers represented three-fifths of total engineering openings as compared to only two-fifths in late 1958 and early 1959. By comparison, demands for aeronautical engineers slumped. Their proportion was 1/25 in November as against 1/8 a year earlier. Changes in the relative importance of demand for electrical and aeronautical engineers from July 1958 to November 1959 are as follows:

Electrical and Aeronautical Openings as a Proportion of Total Unfilled Openings

Month	Percent of Total Unfilled Openings	
	Electrical	Aeronautical
1959		
November	60	4
September	56	13
July	43	17
May	49	12
March	44	13
January	41	13
1958		
November	41	13
September	40	16
July	39	18

Area Trends

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
Summary, 30 Areas	4,110	4,163	6,808	4,154	4,192	3,615	Labor market for engineers continued to improve all through 1959, and at its close was extremely favorable for them. Indicative of the excellent job market is the supply-demand relationship in these occupations. In November 1959, there was one applicant to each unfilled job as compared with 2 applicants a year earlier.
New England Region:							
Boston, Mass.	218	211	216	261	114	156	Serious shortage of engineers continues with undiminished severity. Although number of active applications has remained stable, job orders and unfilled openings have risen significantly. Electrical and electronic engineers lead all other engineering specialties in the number of openings received and unfilled.
Providence, R. I.	47	43	66	7	11	5	Increased number of active applications due to newspaper solicitation for industrial and mechanical engineers. These applicants were mainly seeking job information as they were employed elsewhere.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
Middle Atlantic Region:							
Buffalo, N. Y.	112	97	147	63	40	153	Shortages of electrical engineers, which emerged in September, intensified by November. Other engineering classifications were in adequate or surplus supply.
New York, N. Y.	645	631	1,191	105	81	34	Research and development engineering firms have been augmenting engineering staffs during the past two months. Although those engaged in defense work have shown greatest demand, many local employers active in the civilian segment have also been hiring. Construction engineering concerns working on industrial contracts, on the other hand, continue to move slowly. Several consulting engineers, however, have indicated an interest in filling openings for top designers and other professional personnel for chemical plant design work.
Newark, N. J.	196	176	392	148	153	51	Electrical engineers, who comprise bulk of unfilled openings, needed in production of electronic and high frequency communication equipment and in research and development.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
Middle Atlantic Region: Cont.							
Paterson, N. J.	87	91	206	53	70	34	The greatest shortages among the selected occupations were for electrical engineers. Supply in this category was meager; few applicants have training or experience required by employers.
Philadelphia, Pa.	336	347	411	17	17	142	Slight lowering of supply of engineers only noteworthy change during past two months.
Pittsburgh, Pa.	192	231	305	27	33	33	Decline in active applications due largely to drop in applications from mechanical and civil engineers. Mechanical engineers with experience in design of steel mill coke ovens are being sought.
East N. Central Region:							
Cincinnati, Ohio	38	50	34	40	230	207	Government cutbacks for development of atomic-powered aircraft engines and jet engines for new bombers drastically reduced demand for electrical and mechanical engineers. However, layoffs have not yet affected engineers and technical personnel.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
East N. Central Region: Cont.							
Cleveland, Ohio	109	120	275	70	64	22	Rise in unfilled openings and drop in engineering applicants reflect improved business conditions.
Columbus, Ohio	66	29	25	51	57	26	Engineering registrations doubled due to layoffs arising from aircraft contract cancellation.
Indianapolis, Ind.	19	15	43	25	24	17	No significant change.
Chicago, Ill.	172	225	368	77	157	113	Both demand and supply of engineers dropped between September and November.
Detroit, Mich.	214	273	779	15	5	43	Drop in supply of engineers due to fewer applications from mechanical and industrial engineers.
Milwaukee, Wis.	106	112	154	339	333	157	Slight changes in composition of supply. Applications of mechanical and industrial engineers decreased moderately, while those of other engineers held steady or rose slightly. Current demand largely for electrical and mechanical engineers for research, design, and development.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
West N. Central Region:							
Minneapolis-St. Paul, Minn.	65	58	96	178	186	83	Only significant change in supply was increase in number of industrial engineering applicants. Unfilled openings for engineers down slightly from September although demand for electrical engineers continued to gain.
Kansas City, Mo.	18	22	33	5	6	20	No significant change.
St. Louis, Mo.	53	98	47	180	114	12	Decrease in active applications for engineers due to intensive pre-selection for a construction job. Demand for engineers is largely in aircraft and missiles.
South Atlantic Region:							
Baltimore, Md.	60	59	96	95	94	113	Callbacks at aircraft plant reduced supply of aeronautical engineers. Registrations of mechanical engineers increased while other classifications showed little or no change.
Washington, D. C.	104	115	129	158	78	392	Demand-supply situation tightened. Number of applicants declined while unfilled openings rose sharply.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
South Atlantic Region: Cont.							
Atlanta, Ga.	44	47	66	10	5	3	Supply virtually unchanged. But number of applications from civil and electrical engineers dropped while those from industrial and mechanical engineers increased.
East S. Central Region:							
Louisville, Ky.	15	16	30	5	10	4	Light demand for engineers. No expansion took place in metalworking industries, largest users of engineers in area, because of steel strike.
West S. Central Region:							
New Orleans, La.	52	32	58	5	5	8	Increased supply due to applications from engineers who are employed but seeking better jobs.
Dallas, Texas	73	61	78	122	100	133	Shortage of engineers continues, with most serious deficiency in field of electrical engineering. Demand for electrical engineers results (1) from shift by local aircraft manufacturing plants from conventional aircraft to development and manufacture of missiles and related electronic equipment; and (2) from the rapid expansion of firms in electrical machinery manufacturing.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
West S. Central Region: Cont.							
Houston, Texas	87	105	175	32	14	12	Demand-supply situation tightened in past 60 days. Number of unfilled openings rose while applications dropped. Most openings are for chemical and mechanical engineers.
Mountain Region:							
Denver, Colorado	66	97	87	291	113	57	Fewer engineering registrations reflect continued labor market improvement. Growing demand for electrical, industrial, mechanical, and aeronautical engineers from firms engaged in missiles and related activities.
Pacific Region:							
Seattle, Wash.	71	74	57	1,025	1,018	904	Applications from mechanical engineers dropped as a result of settlement of mechanics labor-management dispute. Demand is substantial for electrical and mechanical engineers capable of meeting specialized requirements of the aircraft industry.
Portland, Oreg.	54	48	59	13	23	4	Unfilled openings dropped as a result of seasonal decline in new orders for civil engineers as well as cancellation of older orders.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, November 1959

Region and Area	Active Applications			Openings Unfilled at end of:			Comments
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	
Pacific Region: Cont.							
Los Angeles-Long Beach, Calif.	603	490	871	688	1,013	648	Demand-supply situation for engineers eased in past 60 days as a result of cutbacks in aircraft industry. Unfilled openings for aeronautical engineers were slashed drastically while the number of job seekers in this classification rose.
San Francisco-Oakland, Calif.	188	190	314	49	24	29	Labor market for engineers as well as for scientists and technical personnel was extremely favorable in November. In a period when the market contracts seasonally, number of job applicants declined slightly. Of the several engineering categories, mechanical engineers had the largest bimonthly and over-the-year drop in registrations. Demand for these engineers was stimulated by the improvement that has taken place in durable goods manufacturing and in engineering and architectural services.

NATURAL SCIENTISTS

November marked the best month in a year of continually expanding job opportunities for natural scientists. All of the Employment Service indicators reflected the improving job market for these workers. Orders received, unfilled openings, and clearance openings in the 30 major centers reporting information on these occupations improved from September to November. Partly as a consequence, the number of job applicants declined by 130 or 18 percent from September to 570 in November.

The supply-demand relationship in this group of occupations, as indicated by the ratio of active applicants to unfilled job openings, also declined. At the end of November, there were 1½ registrants for each job opening as compared with a 2 to 1 ratio for September.

Most of the demand for natural scientists was for physicists or mathematicians. Some significant area comments as to the nature of the needs are as follows: The demand for mathematicians and physicists in Washington, D. C. was generated by numerous Federal government agencies. In Milwaukee, physicists and mathematicians are needed for research on missile guidance systems, atomic heating, and electrical controls. Clearance vacancies for natural scientists in Seattle were placed by Boeing--all for physicists or mathematicians. Requirements for these positions include B.S., M.S., or Ph.D. degrees in mathematics or physics, with experience and interest in high level assignments. Dallas reported a greater demand for natural scientists than indicated by the number of its openings. It reported that highly qualified scientists with three degrees and experience in specified fields are being sought by several employers in the area.

Engineering and scientific jobs seem to be falling into definite strata or classifications, according to a Boston report. It states that the highest level is "project leader" or "team chief;" next in rank come "senior engineers" or "principal scientists;" then the regular or staff men, then the "junior," and finally, on the lowest professional level, the individual holding only the associate in arts degree or having completed but two years of college. As professional jobs are being diluted, far more A.A. degree holders and juniors are being used than was the case in the past.

CHEMISTS

Chemists seeking jobs had their best prospects this year in November. A news item from the Los Angeles-Long Beach area illustrates the excellent job market for qualified workers. A major chemical products firm decided to release about 30 chemists and chemical engineers because of management changes and the closing of one facility. Of these workers only six registered with the public employment office and all were referred immediately to other jobs.

The loose supply situation which characterized the first half of the year began to improve in September. The improvement continued into the closing months of the year, and at the end of November, there were 700 active registrations at employment offices in 30 major employment centers, 10 percent fewer than in September. Demand for chemists as indicated by clearance listings and unfilled openings in the 30 areas was also above the September level.

Indicative of the improved labor market is the sharp over-the-year drop in the ratio of applicants to unfilled openings. This ratio fell from 9 to 1 in November 1958 to 3 to 1 in November 1959.

Area comments are indicative of the improved opportunities: New York City reported that experienced chemists with a knowledge of product development and research on such items as paints, emulsifiers, pharmaceuticals, cosmetics, adhesives, etc., are now in short supply. Pittsburgh stated that the Koppers Company has some 40 jobs open, mainly for chemists with experience in the polyesters plastics and resinous materials. In Dallas, highly qualified chemists with experience in specified fields were being sought by several employers in the area. Not all areas, however, enjoyed improved prospects in November. The job market in San Francisco-Oakland contracted seasonally. Portland reported an increased supply of applicants as in-migrants explored the local area for job opportunities.

DRAFTSMEN

Draftsmen at public employment offices had the largest numerical bimonthly decline in registrations of the selected occupations. This decline occurred despite substantial increases in several areas. Columbus attributed a doubling in supply to aircraft contract cancellation; Los Angeles-Long Beach to curtailment of design work within the aircraft industry and to a tapering off in construction work; while Detroit's was ascribed to layoffs resulting from the steel strike. Offsetting these increases were declines in San Francisco-Oakland where the resumption of steel production, hiring by architectural and engineering firms in San Francisco and in the Palo Alto area, and improvement in durable goods manufacturing combined to give draftsmen a wide diversity of openings and to reduce the number of registrants. In Philadelphia, some mechanical draftsmen were called back by large consulting engineering firms.

Fourteen major labor market areas had changes of at least 10 registrations from September to November; of these, nine had decreases of this size and five had increases.

Despite the decrease in applications, the supply was more than adequate. In the 30 areas, some 3,300 applications were on file in November against a total of less than 900 unfilled openings. Yet, this represents substantial gains from a year ago when 17 applicants were available for each unfilled job.

LABORATORY TECHNICIANS AND ASSISTANTS

The supply of laboratory technicians and assistants, other than medical technicians, was numerically more than adequate for requirements in November. Some 2,150 applications had been filed by job seekers while public employment offices had only 400 unfilled openings.

Many of the unfilled openings are for medical technicians. This classification comprised over 80 percent of the clearance openings in the nation for laboratory technicians in November. Moreover, the countrywide demand for medical technicians is increasing. While there was no change in the number of clearance vacancies for laboratory technicians from September to November, that for medical technicians rose by 31 percent.

In the 30 areas, shortages are common. Houston reports that its medical center has created an urgent need for all professions in the medical field. In Boston, shortages of staff men for medical research and treatment are described as desperate. Part of the difficulty in recruitment stems from rigid requirements. In Washington, D. C. and other areas, only members of the American Society for Clinical Pathologists can qualify for medical technologist positions in the hospitals. There are three training schools in Washington for technicians but applicants in order to qualify for admission must have two years of college science.

DIGEST

of related information

Engineering Enrollments Drop for Second Consecutive Year

The U. S. Office of Education issued an advance release of data collected in the eleventh annual survey of engineering enrollments and degrees. An analytical report, based on the survey, will be published in the series Engineering Enrollments and Degrees, 1959. The data on engineering enrollments in this series are confined to the 233 colleges which confer engineering degrees.

Some highlights of the 1959 survey are:

1. Total engineering enrollment declined for the second consecutive year. The total reported--278,348 students--was 3.9 percent below last year. By contrast, the opening (fall) enrollment of all degree-credit students in institutions of higher education increased 4.4 percent since 1958.

2. Undergraduate enrollment in engineering--242,992--was down 5.4 percent. The drop in freshmen was 3.3 percent. By contrast, total college first-time enrollment was up 5.9 percent.

3. Graduate enrollments in engineering reached new peaks at all levels. Enrollment for the master's degree numbered 29,713--up 5.6 percent from last year; and for the doctor's degree, 5,643--up 18.5 percent from last year.

4. The number of degrees awarded in engineering continued to rise at all levels: bachelor's degree, up 7.9 percent; master's degrees, up 16.7 percent; and doctor's degrees, up 10.4 percent.

Security for Engineers

A false appraisal of long-range career opportunities was the principal reason for the 1958 drop in engineering enrollments, according to more than 100 deans of engineering who were questioned by the Engineering Manpower Commission.

But the recession was not too tough on the engineering and scientific professions. The figures show that when the industry outlook was poorest, few prospective graduates in engineering lacked employment. In the opinion of Howard A. Meyerhoff, Executive Director, Scientific Manpower Commission, if the prospective engineer's search is for security, there is no better place to find it than in basic research and its applications.

Howard A. Meyerhoff, "Security for
Technical Graduates" in Industrial
Science and Engineering, October 1959

1959 Recruiting Survey

Highlights of the 1959 annual recruiting survey conducted by the Midwest College Placement Association, covering 225 companies, are:

1. The 1959 recruiting year was characterized by an upward trend in technical requirements. Actual hires, with 220 companies reporting, were 80 percent of final requirements. One reason for quotas not being met was continued high selectivity on the part of companies in their search for graduates. In 1958, 89 percent of the need was met.

2. Demand for technical graduates will be higher in 1960. Of 209 companies estimating 1960 requirements, 118 estimated that they will need the same number of graduates as were hired in 1959, 69 indicated that they would need 1,656 more graduates, while 22 companies said they would need 475 fewer graduates.

3. Salaries will also be higher in 1960. The average salary offer to 1959 technical graduates with a B.S. degree was $490 a month, up 4.5 percent over 1958. For 1960, the companies expect to pay the technical graduate with a B.S. degree $499 a month. But, companies are usually conservative and experience indicates that actual salaries offered will be higher than estimated.

4. Aircraft and parts and research firms made the highest salary offers ($521) to technical graduates with a B.S. degree; insurance companies, the lowest ($423).

Journal of College Placement
October 1959

Overcoming the Engineering Shortage

The Astrionics Division of Fairchild Aircraft in Long Island is tapping the large pool of highly qualified but retired engineers in an effort to meet a chronic need for more engineers. The company advertises in the New York Times and Wall Street Journal for "Retired Technical Talent Only."

Richard Gulliver, industrial relations manager, conceived this idea of turning to the older-age group for professional assistance. Engineers who qualify can work out their own time schedule with Fairchild.

Gulliver has great expectations for the success of this program. The retired man who wants to go back to work is a "really dedicated type." The older man is apt to work steadily and consistently where the young fellow alternates great bursts of activity with lengthy coffee breaks. Harmonious relations between the older newcomers and the regular engineering staff are expected. Engineers, Gulliver says, recognize the seriousness of the manpower shortage and know that the retired man may be old in years but not in his thinking.

Product Engineering
October 5, 1959

Forecast for the 1960's: Higher R & D Expenditures and Scientific Manpower Needs

Total expenditures for research and development are expected to rise to $22 billion in 1969 from $12 billion in 1959. This outlay will require 45 percent more scientists and engineers in R & D in 1969 than we have today. These estimates were presented at the annual meeting of the American Economics Association held in Washington, D. C. on December 30, 1959.

The character of R & D spending is expected to change. The prospect is that in 1969 a smaller share of the total will be devoted to government research (particularly defense type) and larger shares will be devoted to industrial and basic research.

Dexter M. Keezer, Douglas Greenwald,
Robert P. Ulin, "The Outlook for
Expenditures on Research and Development During the Next Decade"

Women Scientists: Job Opportunities and Rewards

Some 14,000 women out of a total of better than 170,000 were employed in five fields--astronomy, chemistry, geology, meteorology, and physics--of the physical sciences in 1958. The vast majority of women scientists are chemists. But some are found in all these fields.

The Women's Bureau in a new publication, "Careers for Women in the Physical Sciences," tells girls how to prepare for a future career in science, the job outlook in each of the five fields, the kinds of work for which women scientists may prepare, and the rewards such work offers.

Employment of Engineers and Scientists Up in 1958

Employment of engineers in private industry rose by 25,000, or 4 percent, from January 1958 to January 1959 while that of scientists went up from 145,000 to 150,000, according to a recent BLS survey for the National Science Foundation.

About 35 percent of the 780,000 engineers and scientists were engaged in engineering and scientific research and development activities.

Scientists and engineers in the industry sectors are estimated to represent about two-thirds of the scientists and engineers employed in the Nation. The other third are employed in government agencies, educational institutions, and non-profit organizations, or were self-employed.

The aircraft and parts, electrical equipment, and chemicals and allied products industries employed the largest numbers of engineers and scientists. Each employed more than 75,000 engineers and scientists; combined, they employed one-third of the total number of engineers and scientists in private industry, and accounted for one-half of those engaged in research and development. The machinery (except electrical) industry and engineering and architectural services employed over 50,000 but less than 75,000 engineers and scientists. Next came construction, fabricated metal products and ordnance, primary metals, and motor vehicles and equipment. Each employed over 30,000 but less than 50,000 engineers and scientists.

Federal Recruitment of Engineers Hampered by Low Salaries

Federal government needs for engineers, scientists, and technicians will increase 25 percent from 1958 to 1963, according to Roger W. Jones, Chairman, U. S. Civil Service Commission. But the recruitment and retention of these people will be a problem, he told members of the Manpower Utilization Subcommittee of the House Committee on Post Office and Civil Service. Low salaries is the principal reason engineers decline Federal job offers.

Chairman Jones stated that industry paid an average of $5800 to $6200 for the B.S. degree graduates in engineering and physical science of the June 1959 class compared to Federal rates of $4490 for the average graduate and $5430 for the superior graduate. For 1960, it is estimated that industry rates will go up an additional two to four percent.

Government acceptance rate (that is, the percent of acceptances to firm offers of employment) for engineers and scientists rose from 29 percent in 1956 to 40 percent in 1958. But in 1959, it fell to

35 percent. The industry rate was 46 percent in 1958 and 43 percent in 1959. The decrease in the Federal rate was sharper for engineers than for physical scientists; for engineers the rate in 1959 was 31 percent, a drop of 6 percentage points from the 37 percent rate in 1958.

Forecast for 1960: Employment and Salaries of Engineers Will Be Up

Frank S. Endicott, Director of Placement, Northwestern University recently issued the 14th annual survey, "Trends in the Employment of College and University Graduates in Business and Industry, 1960." The survey, conducted during November 1959, covered 211 business and industrial firms. Some of the highlights of the report are:

1. The demand for college and university graduates will continue to increase. Companies surveyed indicated that they will need 19 percent more engineers and other graduates than they employed from the classes of 1959. The 202 reporting companies said that they will need 7,396 engineers and 9,863 non-engineers for a total of 17,259. The 1959 total was 14,511, of which 6,212 were engineers.

2. Starting salaries will again increase. Furthermore, the differential in favor of the engineering graduate over the graduate in general business will increase. The average salary for 1960 engineering graduates is expected to be $515 per month, at least $80 per month more, on the average, than the salary for general business graduates. Five years ago, 1955, this differential was only about $32.

3. The greatest turnover in employment occurs during the first three years. The typical company loses about 36 percent of its newly hired college men by the end of the fifth year. To remedy this, the report stresses more careful screening of applicants, more challenging and interesting assignments, and more recognition of achievement.

Defense Official Sees Possible Unemployment of Electronics Engineers

Considerable unemployment in the electronics engineering profession in the near future is a distinct possibility, James M. Bridges, Director of Electronics, Office of the Secretary of Defense for Research and Engineering, warned a meeting of the Syracuse Chapter of the Armed Forces Communications and Electronics Association. Some highlights of his speech are:

1. During the next year or so there will be a substantial reduction in the engineering effort going into continental air defense against manned aircraft. This includes all types of interceptor-aircraft electronics, airborne early warning, surface-to-air and air-to-air guided missiles, data links, ground radars, identification devices, data-processing equipment and many other associated system elements. Likewise, it appears that future engineering effort in manned-bomber electronics will be drastically reduced.

2. These areas of electronic engineering have employed a substantial percentage--40 to 50 percent--of all of the electronics technical people working on defense programs in the past several years.

3. As the demands for engineers in this area of defense decrease, there will be an increasing demand in other areas, such as space, ballistic missiles, ballistic-missile defense, tactical warfare, communications and antisubmarine defenses.

4. The expanding areas of defense will not absorb all electronics engineers now engaged in defense work.

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is the Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas 1/ for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

1/ The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 29.

List of 30 Major Labor Market Areas by Regions

New England:

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Newark, New Jersey
Paterson, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Indianapolis, Indiana
Chicago, Illinois
Detroit, Michigan
Milwaukee, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
Kansas City, Missouri
St. Louis, Missouri

South Atlantic:

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Dallas, Texas
Houston, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-January 1960

Month and Year	All Occupations	Professional & Managerial	Selected Occupations 1/				
			Total	Engineers	Scientific	Draftsmen	Technicians
Jan. 1956	27,887	12,845	6,803	4,792	435	1,361	215
Jan. 1957	35,629	14,498	8,993	6,349	389	1,988	267
March	34,390	15,952	9,300	6,428	732	1,851	289
May	31,452	14,007	8,404	5,976	576	1,591	261
July	29,144	11,879	7,407	5,437	590	1,174	206
Sept.	23,208	8,986	5,480	3,946	569	791	174
Nov.	13,859	5,388	2,879	1,993	294	384	208
Jan. 1958	14,665	7,726	2,582	1,817	245	315	205
March	14,451	8,244	3,496	2,717	398	204	177
May	15,552	9,439	3,505	2,764	330	244	167
July	14,420	7,514	3,540	2,921	233	212	174
Sept.	15,363	8,732	5,303	4,447	431	255	170
Nov.	17,661	9,308	4,789	3,906	475	243	165
Jan. 1959	16,042	10,530	5,426	4,386	489	377	174
March	17,960	10,820	5,473	4,278	576	391	228
May	23,232	12,828	5,635	4,387	602	402	244
July	20,559	10,112	5,315	4,128	486	495	206
Sept.	21,414	10,140	6,320	5,096	500	548	176
Nov.	21,101	11,740	6,585	5,193	600	616	176
Jan. 1960	19,735	11,834	5,817	4,389	648	605	175

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Table II. Clearance Openings in Selected Occupations 1/ November 1959, September 1959, and November 1958

Occupation	Nov. 1959	Sept. 1959	Nov. 1958	Percent Change to Nov. 1959 from:		Percentage Distribution
				Sept. 1959	Nov. 1958	Nov. 1959
All selected occupations	6,585	6,320	4,789	+4.2	+37.5	100.0
Professional						
Engineers, total	5,193	5,096	3,906	+1.9	+32.9	78.9
Metallurgical	46	77	27	-40.3	a/	0.7
Chemical	87	100	58	-13.0	+50.0	1.3
Civil	210	223	792	-5.8	-73.5	3.2
Electrical	2,727	2,558	1,570	+6.6	+73.7	41.4
Industrial	388	335	172	+15.8	+125.6	5.9
Mechanical (exc. aero.)	1,094	979	909	+11.7	+20.4	16.6
Aeronautical	641	822	377	-22.0	+70.0	9.7
Mining	0	2	1	a/	a/	b/
Other professional	600	500	475	+20.0	+26.3	9.1
Natural scientists	468	360	384	+30.0	+21.9	7.1
Physicists	240	162	194	+48.0	+23.7	3.6
Mathematicians	150	145	137	+3.4	+9.5	2.3
Statisticians	3	4	5	a/	a/	b/
Life scientists	53	47	38	+12.8	a/	0.8
Earth scientists	21	2	10	a/	a/	0.3
Chemists	132	140	91	-5.7	+45.1	2.0
Semiprofessional						
Draftsmen, total	616	548	243	+12.4	+153.5	9.3
Mechanical	257	261	75	-1.5	+242.7	3.9
Other	359	287	168	+25.1	+113.7	5.4
Laboratory technicians and assistants, total	176	176	165	n.c.	+6.7	2.7
Medical technicians	152	116	133	+31.0	+14.3	2.3

a/ Percent change not shown where both absolutes are less than 50.
b/ Less than 0.05 percent.

n.c.--no change

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas for Seclected Occupations, November and September 1959, and November 1958

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958
Total	705	786	919	570	698	715	3,307	3,456	6,837	2,156	2,169	2,874
Boston	26	50	49	20	26	42	146	149	202	79	132	123
Providence	6	7	13	4	7	5	30	24	38	26	23	32
Buffalo	17	20	21	15	11	8	66	67	96	66	55	86
New York	182	208	291	119	115	163	650	597	1,286	354	376	354
Newark	55	51	75	28	29	49	64	99	339	117	99	226
Paterson	14	12	23	11	3	5	52	51	116	59	45	72
Philadelphia	31	46	44	19	30	21	302	366	371	169	182	215
Pittsburgh	22	27	34	11	32	23	221	298	534	144	146	342
Cincinnati	4	12	0	1	9	2	43	46	39	35	44	35
Cleveland	11	15	12	9	10	9	83	88	357	37	53	95
Columbus	4	1	6	2	2	5	36	18	26	15	21	14
Indianapolis	2	1	0	2	1	2	16	8	26	17	13	25
Chicago	49	52	60	12	19	11	130	159	425	111	104	147
Detroit	18	22	21	5	25	8	128	77	998	52	78	156
Milwaukee	15	18	22	17	18	24	15	13	93	12	11	41
Minneapolis-St. Paul	18	19	12	14	21	13	57	95	128	35	54	49
Kansas City	5	13	5	1	10	3	17	22	26	11	7	14
St. Louis	10	11	5	12	17	4	45	60	58	54	44	31
Baltimore	12	12	14	5	3	8	48	51	100	31	33	40
Washington	26	32	28	60	66	53	60	67	83	35	40	69
Atlanta	7	5	6	4	4	4	51	33	24	20	28	38
Louisville	5	2	6	4	4	3	20	25	11	27	13	25
New Orleans	8	6	12	14	22	10	49	48	35	19	17	16
Dallas	6	2	6	20	19	32	48	47	61	28	26	20
Houston	12	24	24	23	39	48	81	99	168	42	48	64
Denver	5	7	8	25	43	21	37	38	33	60	45	29
Seattle	7	8	6	5	8	10	70	89	51	23	22	34
Portland	16	8	7	13	9	11	34	40	57	37	21	41
Los Angeles-Long Beach	81	70	71	67	62	73	520	467	813	304	258	239
San Francisco-Oakland	31	25	38	28	34	45	188	215	243	137	131	202

Table IV. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas for Selected Occupations, End of Month, November and September 1959, and November 1958

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958	Nov. 1959	Sept. 1959	Nov. 1958
Total..............	221	213	105	368	348	386	872	955	413	409	466	364
Boston...............	7	5	5	9	10	6	114	72	55	56	56	19
Providence...........	2	1	0	0	1	0	4	9	6	2	4	0
Buffalo..............	9	8	5	16	9	47	6	8	13	13	15	10
New York.............	26	24	19	10	6	8	85	92	9	66	78	43
Newark...............	38	36	0	3	3	0	50	31	14	24	23	2
Paterson.............	3	2	1	7	1	0	20	18	0	7	23	0
Philadelphia.........	0	1	2	0	0	0	10	10	9	7	3	5
Pittsburgh...........	14	9	5	4	1	8	21	16	3	3	20	9
Cincinnati...........	9	5	0	0	5	7	9	4	6	9	9	8
Cleveland............	6	5	9	0	4	1	27	32	6	10	11	11
Columbus.............	3	2	2	1	0	2	17	26	4	3	4	10
Indianapolis.........	2	1	1	2	3	3	7	5	4	4	4	3
Chicago..............	17	21	14	0	10	2	42	61	22	14	24	41
Detroit..............	0	0	0	0	1	0	13	9	30	5	1	4
Milwaukee............	9	6	5	104	108	10	122	117	39	18	16	13
Minneapolis-St. Paul..	13	21	7	19	10	5	48	43	22	13	14	18
Kansas City..........	1	0	1	0	0	0	2	2	9	3	2	2
St. Louis............	9	7	0	6	3	0	20	23	3	11	14	10
Baltimore............	1	1	0	1	1	1	22	45	5	13	5	0
Washington...........	7	6	1	46	35	45	43	8	13	33	37	58
Atlanta..............	1	0	0	0	0	0	2	7	3	1	1	2
Louisville...........	3	9	0	0	0	0	2	1	4	0	0	0
New Orleans..........	0	1	1	0	0	0	0	1	2	0	1	1
Dallas...............	1	1	1	2	5	2	10	7	15	4	1	1
Houston..............	1	1	0	1	0	2	1	9	2	0	1	1
Denver...............	0	2	0	17	4	0	21	14	3	23	4	3
Seattle..............	2	1	0	50	50	202	8	10	8	0	2	7
Portland.............	0	1	0	1	0	0	9	11	1	2	5	2
Los Angeles-Long Beach	32	28	24	63	73	32	107	237	83	41	63	51
San Francisco-Oakland.	5	8	2	6	5	3	30	27	20	24	25	30

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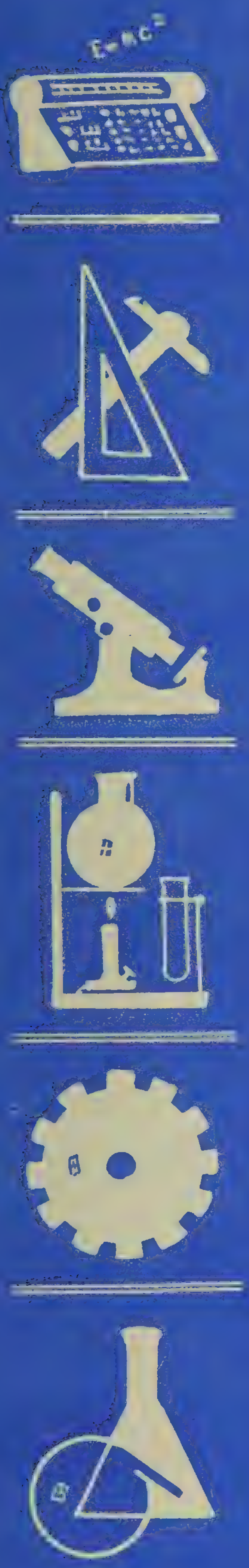

CURRENT LABOR MARKET CONDITIONS in ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

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MARCH 1960

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director
Washington 25, D. C.

CURRENT LABOR MARKET CONDITIONS
in
ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

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Office of Program Review and Analysis

Louis Levine, Deputy Director, Bureau of Employment Security

This bimonthly report is prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It is based on field reports on current conditions in 30 major labor market areas, statistics on job openings for selected engineering, scientific and technical occupations placed in inter-area clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources.

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Trend Indicators

AIRCRAFT AND MISSILES INDUSTRIES MANPOWER REQUIREMENTS: Government expenditures are reflected in the changing fortunes of the aircraft and missiles industries as well as manpower needs. Allocations for missiles have been climbing, while those for manned aircraft have been decreasing over the years. Government funds for missiles stand at 6.8 billion in fiscal 1960, more than 100 times the 58 million in 1947. Manpower reports from aircraft centers show declining needs--Los Angeles-Long Beach: Recent widespread layoffs in the aircraft industry contributed to a general easing of supply and demand relationship of engineering personnel. Atlanta: A substantial number of professional and supervisory workers with aircraft manufacturing experience became available for employment due to cancellation of a special bomber subcontract. Seattle: Local aircraft industry no longer needs the number of engineers and other technical personnel that it did in the past and has, consequently, cut back on hiring; in some cases, it is actually releasing present personnel. . . . But missiles' requirements continue to expand. Philadelphia: Ever-expanding research and development in the fields of missiles and space technology enlarging the demand. Certainly all persons who possess even minimum qualifications are employed in this work. Milwaukee: Among the most significant projects underway currently are those involving missile guidance systems. St. Louis: Greatest need is for electrical engineers due to increasing activity in the missile field.

OUTLOOK FOR JUNE GRADUATES: The University of Pittsburgh predicts that engineering graduates will make the most money but that there are plenty of jobs for other members in the class of 1960. More than 270 business firms and government agencies will conduct job interviews at Pittsburgh. According to the Placement Director, there are more opportunities than ever before and by July 1, 95 percent of Pittsburgh's graduating seniors will have jobs. Greatest demand is for electrical, metallurgical and chemical engineers. . . . And Carnegie Institute of Technology expects demand and salary offers to exceed last year.

TRENDS IN RECRUITING FOR SHORTAGE OCCUPATIONS: In the Boston area it is the common practice for a firm to pay an applicant's travel expenses to Boston from his home and his hotel bills and other expenses and then to pay return fare, whether he is hired or not. . . . A research agency seeking astronomers is offering to degree-holding personnel who qualify a free all-expense trip to the Institute of Radio Engineers meeting and exposition in New York City in late March. . . . Other private agencies recruiting scientific, engineering, and technical personnel advertise that all charges are paid by the employer.

DUAL JOBS: Most of the demand for mechanical engineers in the Philadelphia area has an electronic twist because electronically controlled servo-mechanisms are the main product of the firms seeking these workers.

RELIEVING THE ENGINEERING SHORTAGE BY JOB DILUTION has met with indifferent success. From Philadelphia: Since most of the work is research and development not much can be done to dilute the jobs to the subprofessional level and even here a roadblock is encountered in a shortage of competent technicians. . . . While from Boston: Some job dilution is being practiced but this only serves to shift the shortage emphasis to other categories. Most local concerns have stepped up their requirements for laboratory technicians, technologists, assistants, "juniors," and aides. The base is being broadened through the utilization of subordinate skills.

ASTRONOMERS - A SERIOUS SHORTAGE BUT NOT OF LARGE DIMENSION. Astronomy is still chiefly in the academic realm, with colleges and universities providing most of the employment opportunities. However, government uses a large number of astronomers in satellite tracking and astrophysical work.

HIRING SPECIFICATIONS IN SHORTAGE OCCUPATIONS: Several areas indicated how employers accommodate their job specifications to current conditions in the labor market.

Educational and experience requirements: Employers in the Boston area are placing more emphasis on advanced degrees. Firms which formerly would gladly interview any individual with only a bachelor's degree for vacancies in the shortage occupations are now not nearly so anxious to see these individuals. Their requirements are pointed to a higher academic level of achievement plus related experience. . . . In Seattle, employers are adopting a more selective attitude. They seek applicants with specific capabilities and experience. . . . Similarly, in Cleveland employers demand post-graduate training and longer periods of experience in particular engineering fields. . . . And in Milwaukee, many of the natural scientists openings specify doctors or masters degrees.

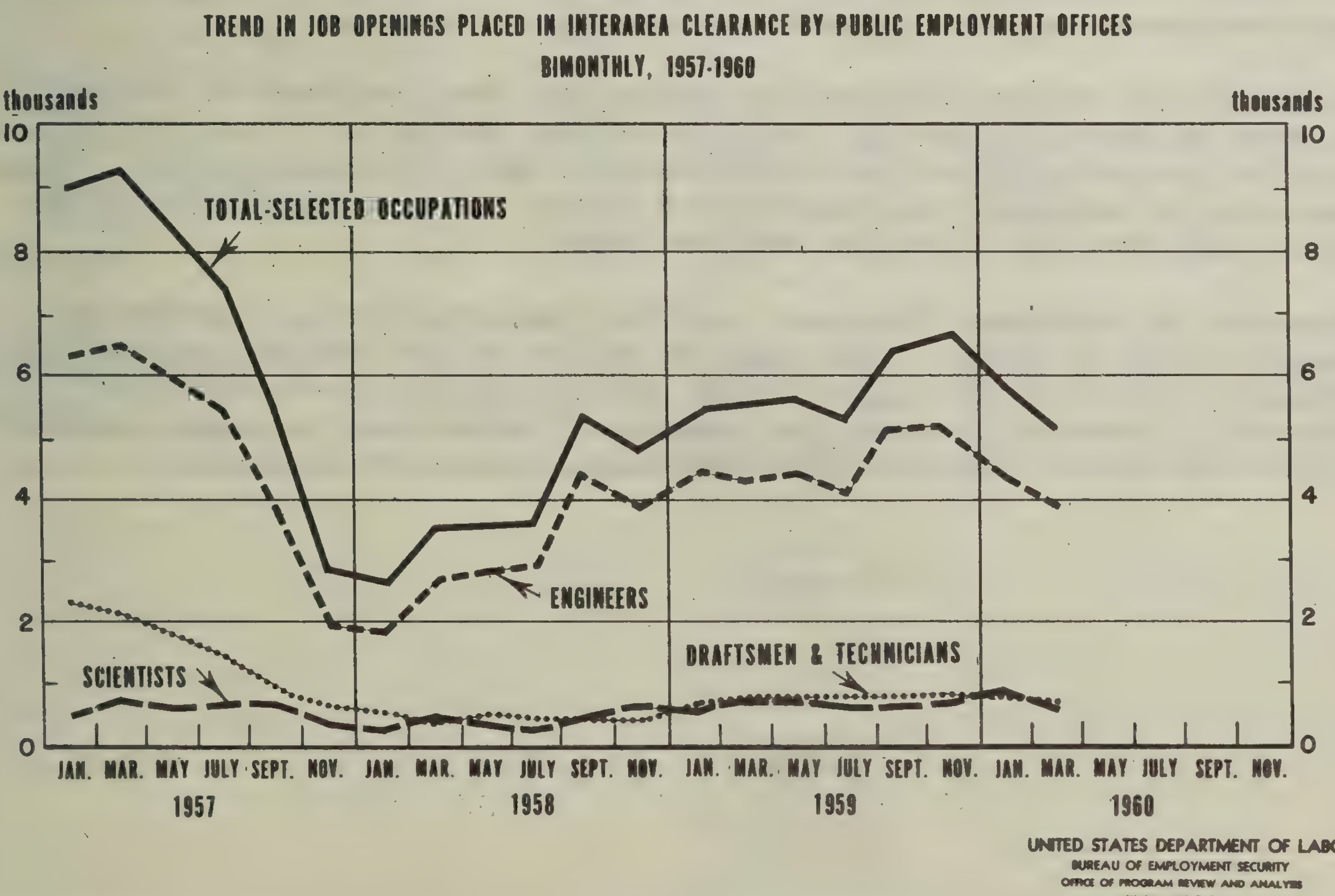
Age requirements: Newark reports age is not of primary importance in hiring in these occupations. . . . Similarly, in Milwaukee age and physical standards, in general, have not been a barrier to qualified applicants. . . . But in Cleveland, age restrictions seem to exist to a great degree.

ENGINEERS WITH COMPUTER TRAINING AND EXPERIENCE WANTED: The design and production of electronic data processing machinery for industry as well as for government are spurring the demand for engineers. Firms expanding in the electronic data processing field are seeking digital-computer engineers experienced in advanced design and development. The extension of computer activities into the industrial field is creating a need for engineers with experience in logic design, digital and pulse computers, core memories, input output pulses, servo systems, telemeters, and programming. Graduates in physics, engineering, and mathematics will find many opportunities in this dynamic field.

recent developments in

INTERAREA RECRUITMENT

Early Spring marked a continuation of the downturn in job openings in interarea recruitment of engineers, scientists, and technical personnel. In the two bimonthly periods since the beginning of the year, vacancies in these selected occupations dropped by over one-fifth, in approximately equal proportions for each period. Like the January decline, cutbacks in the needs of the aircraft industry accounted for the softening job market in March. While the January drop was limited to engineering vacancies, the March decrease extended to all classifications of natural scientists and draftsmen. But in the engineering category, the decline was confined to the electrical and mechanical group. In all of the occupations covered in this report, clearance listings in March were 5,150, a decline of 650, or 11 percent from January. They were also 6 percent lower than the number reported in March 1959.



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

The drop in engineering vacancies in March brought the number of clearance listings to a low for 1959-1960. Recruitment for electrical engineers, which has long dominated engineering vacancies, was off sharply when the aircraft industry withdrew substantial orders. At the same time, vacancies for mechanical engineers eased. Meanwhile, increased job opportunities for other subgroups, particularly for aeronautical and chemical engineers, rose. For the engineering group as a whole, listings were off 450 from January to 3,900 in March.

The reduced demand for electrical engineers eased but did not eliminate the pressing shortage in this category. Although public employment offices listed 550 fewer job openings than in January, the 1,970 listings in March still comprised half of all engineering vacancies, well above the 35 percent of March 1959.

Reduced clearance vacancies for physicists and mathematicians caused most of the decline in job openings for natural scientists. Fewer States reported listings for physicists in March than in January, and a manufacturer of missile control systems in California withdrew openings for physicists experienced in research, design and development of circuits, fuels and varied electronic devices used in missiles. In Ohio and Washington employment opportunities for mathematicians were curtailed because of cutbacks in aircraft production. However, needs existed for physicists and mathematicians in Wisconsin, which had openings in each specialty for research and development in guided missile programs.

The bright job market for chemists induced the American Chemical Society to issue an interim report on their employment prospects. Clearance vacancies for chemists reflect the improvement in their job opportunities. While vacancies in interarea clearance showed little change between January and March, they were up 60 percent over the year.

Vacancies for draftsmen decreased over the bimonthly period from 605 in January to 442 in March. More than two-thirds of the decline occurred in Michigan because of the reduced needs for draftsmen in the automobile industry. Clearance openings for laboratory technicians increased between January and March, indicating the continuing nature of the demand.

Number of Nonagricultural Job Openings in Selected Occupations in Interarea Clearance at Public Employment Offices, U. S. Total, March and January 1960, and March 1959

Selected Occupations	Job Openings			Change to March 1960 from:			
				Jan. 1960		March 1959	
	March 1960	Jan. 1960	March 1959	Number	Percent	Number	Percent
All Selected Occupations	5,167	5,817	5,473	-650	-11.2	-306	-5.6
Engineers, total	3,927	4,389	4,278	-462	-10.5	-351	-8.2
Chemical	144	98	103	+46	+46.9	+41	+39.8
Civil	238	218	397	+20	+9.2	-159	-40.1
Electrical	1,986	2,532	1,891	-546	-21.6	+95	+5.0
Industrial	242	225	211	+17	+7.6	+21	+14.7
Mechanical	969	1,055	932	-86	-8.2	+37	+4.0
Aeronautical	303	216	701	+87	+40.3	-398	-56.8
Selected Scientific Occupations	587	648	576	-61	-9.4	+20	+1.9
Natural Scientists	404	468	461	-64	-13.7	-57	-12.4
Physicists	210	234	184	-24	-10.3	+26	+14.1
Mathematicians	140	159	170	-19	-12.0	-30	-17.7
Other	54	75	107	-21	-28.0	-53	-49.5
Chemists	183	180	115	+3	+1.7	+68	+59.1
Draftsmen	442	605	391	-163	-27.0	+51	+13.0
Laboratory technicians	211	175	228	+36	+20.6	-17	-7.5

CURRENT TRENDS IN LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

The labor market for engineers, scientists, and technical personnel eased between November and January. An acceleration in the downward trend in manned aircraft employment in major production centers more than offset continuing brisk demands for specialized manpower for research and development in spacecraft programs and for computer and electronic development. As a consequence, the number of applicants in these occupations in 30 major labor market centers increased by 1,500, or 14 percent, from November to 12,400 in January.

Engineers and draftsmen were particularly hard hit by the cutbacks in aircraft procurement. Of the engineers, those most affected by the layoffs were mechanical and aeronautical engineers. Although the supply of electrical engineers increased in January, demand was strong for this specialty. Chemical engineering was the only category in the engineering group in which the number of applicants declined, an indication of the continuing good job market for these people.

While the supply of draftsmen rose in the 30 centers, shortages in certain specialties became pronounced. Piping draftsmen, as well as those with experience in refrigeration, heating, and ventilating were in short supply. The usual spring upturn in construction is expected to absorb many of the applicants.

Despite a slight rise in orders received for natural scientists, their supply increased from November to January. The major needs are for mathematicians and physicists, especially with advanced degrees, for work in the fields of missiles and electronics.

Chemists continued to enjoy a favorable job market. Increasing opportunities for employment and dwindling supplies led to an improvement in the demand-supply relationship. Further improvement is expected with the resumption of seasonal food processing.

Among laboratory technicians and assistants, there was a persistent shortage of medical technicians. But little hope is held for improving this situation, as job requirements are high but salaries offered low.

ENGINEERS

At the beginning of the year, the job market for engineers eased. Divergent movements were very much in evidence. On the one hand, the long-term trend away from manned aircraft seemed to accelerate in January, with drastically-curtailed demand for and an increased supply of engineers in the largest aircraft production centers. On the other hand, shortages of electronic engineers intensified in some areas because of increased allocations for missiles and related items. Meanwhile, seasonal influences eased the supply of civil engineers. Other factors which tended to increase the supply of engineers were (1) an influx of mid-term college graduates at public employment offices and (2) registrations of employed engineers in anticipation of impending cutbacks in production. The overall result was that just as many areas experienced an increase in the number of job seekers as had fewer registrations. But, for the 30 areas combined, the supply of engineers increased by about one-fifth.

Three areas--Los Angeles-Long Beach, New York City, and Washington, D. C.--accounted for a major share of the increased number of registrations at public employment offices. The Los Angeles-Long Beach area, particularly hard hit by cutbacks in aircraft, reported 595 more engineers seeking work in January than in November. New York City attributed a rise of slightly over 100 more registrants in January than in the previous bimonthly reporting period to new entrants, the recent college graduates, into the labor market. In that area, employers' needs for specialized experience were curtailing job opportunities for the winter graduates of engineering schools. The Washington, D. C. report also indicated a sharp upturn in applicants. This was attributed either to cutbacks or the anticipation of layoffs by engineering firms in and around the surrounding area.

In contrast with these areas of increased supply, Boston had fewer engineering job seekers in January. The diligent search for engineering talent by new firms locating in the area as well as the expansion of established plants precluded any real, tangible improvement in the supply. In other areas, declines in the number of job seekers were fairly nominal, and, in some instances, represented an outmigration of engineers because of curtailed job opportunities.

In the 30 areas combined, the number of engineering job registrants rose by 800, or 19 percent, from November to January. The upturn in registrations extended to all engineering classifications, except chemical engineers. The dwindling number of chemical engineers at public employment offices is but another indication of the bright job market in this specialty. An independent survey by the American Chemical Society also shows employment opportunities approaching a new high for chemists and chemical engineers.

Number of Engineering Job Applicants
January 1960, November 1959, and January 1959

Engineering Specialty	Active Applications			Change to Jan. 1960 from:			
				Nov. 1959		Jan. 1959	
	Jan. 1960	Nov. 1959	Jan. 1959	Number	Percent	Number	Percent
Engineers, total	4,941	4,138	6,384	+803	+19.4	-1,443	-22.6
Metallurgical	75	58	121	+17	+29.3	-46	-38.0
Chemical	272	300	420	-28	-9.3	-148	-35.2
Civil	963	858	1,133	+105	+12.2	-170	-15.0
Electrical	705	606	921	+99	+16.3	-216	-23.5
Industrial	766	727	1,176	+39	+5.4	-410	-34.9
Mechanical	1,855	1,412	2,399	+443	+31.4	-544	-22.7
Aeronautical	236	133	131	+103	+77.4	+105	+80.2
Mining	69	44	83	+25	+56.8	-14	-16.9

The largest numerical gain in applications was for mechanical engineers. They were particularly hard hit by contract cancellations of aircraft programs in Los Angeles-Long Beach. Unfortunately, many of them, although experienced in tooling and design work in aircraft, were not qualified to work in the missiles and electronic fields. Other large gains were in registrations from civil, electrical, and aeronautical engineers. In each of these specialties, about 100 more applicants were seeking jobs in January than in November.

Nationwide demand for engineers, as indicated by the number of openings placed in interarea clearance, fell in January. In the fall of 1959, these openings had fluctuated between 5,100 and 5,200. But in January they dropped to 4,400, the same level as the year before. More than half of the cutback in demand was in vacancies for aeronautical engineers, because of the slashes in aircraft procurement. Vacancies for electrical and industrial engineers also fell (see Tables I and II).

In the 30 labor market areas, demands for engineers eased between November and January but the drop in clearance openings was slight compared to the national total. Only 100 fewer vacancies were reported in January than in November. The reduction in listings in these areas was principally for mechanical and electrical engineers. However, demand for electrical engineers in these areas, as indicated by clearance openings, actually intensified.

The rise in clearance openings for electrical engineers between November and January was most marked in the Newark area, where the continuing demand for this specialty was in research, design, and development of electrical equipment for computer, radar, and missile guidance systems. But in the Los Angeles-Long Beach area, clearance vacancies for electrical engineers were sharply curtailed. Most reporting areas indicated a sustained demand for electrical and electronic engineers, with many opportunities in the field of missiles and missile guidance systems.

The shortage of engineers in the missile field, while well known, is documented by a Bureau of Employment Security survey of missile employment in October 1959. Shortages of engineers were indicated by 167 establishments, while 44 plants reported an under-supply of nonengineering professionals. The report of manpower shortages in establishments producing missiles in October 1959 is indicated in the following table.

Manpower Shortages in Missile
Producing Plants
October 1959

Occupations for Which Shortages Were Reported	No. of Establishments	Average Employment Per Establishment		Missile Employment October 1959	
		Total	Missile Work	Number (000)	% Change from Oct. 1958
Engineers	167	3,928	1,774	296.3	+24
Professionals (other than engineers)	44	5,194	2,151	94.6	+34
Skilled Occupations	136	4,438	1,745	237.3	+24
Other Occupations	156	1,765	506	79.0	-1

Note: Establishments reporting shortages in more than one category are shown separately for each category.

Source: Industry Manpower Survey No. 95

The continuing bright job opportunity picture for electrical engineers is also reflected in the proportion that this group represented among all unfilled job openings by public employment offices in the 30 major labor market areas of the country. The rising trend in their unfilled openings stands in sharp contrast to the diminished vacancies for aeronautical engineers.

Electrical and Aeronautical Openings as a Proportion of Total Unfilled Openings

Month	Percent of Total Unfilled Openings	
	Electrical	Aeronautical
1960		
January	61	3
1959		
November	60	4
September	56	13
July	43	17
May	49	12
March	44	13
January	41	13
1958		
November	41	13
September	40	16
July	39	18

Area Trends

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
Summary, 30 Areas	4,941	4,138	6,384	3,890	4,121	3,935	Two cross currents were at work in the 30 areas in the past 60 days. On the one hand, government cutbacks for manned aircraft in several centers sharply reduced the demand and also increased the number of applicants. On the other hand, allocations for missiles and related items boosted demands for electronic engineers. Meanwhile, seasonal influences eased the supply of civil engineers. The overall result was that as many areas experienced an increase in the number of applicants as had fewer registrations. But, for the 30 areas combined, applications increased by about one-fifth.
New England Region:							
Boston, Mass.	166	218	209	223	261	264	No real tangible improvement in the supply of engineers nor do demands in specialized categories appear to be moderating to any appreciable extent. In the last 60 days there was some decrease in the number of job seekers but most of these were civil engineers who specialized in construction work.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications Jan. 1960	Active Applications Nov. 1959	Active Applications Jan. 1959	Unfilled Openings at end of: Jan. 1960	Unfilled Openings at end of: Nov. 1959	Unfilled Openings at end of: Jan. 1959	Comments
New England Region: Cont.							
Providence, R. I.	31	47	61	3	7	4	Supply of engineers was at its lowest point in two years. Reduction in mechanical engineers accounted for decline in number of engineering applicants.
Middle Atlantic Region:							
Buffalo, N. Y.	82	112	138	57	63	147	Labor market for engineers improved. While number of job seekers declined, unfilled openings held near the November level. Shortages of metallurgical and chemical engineers emerged by January. These classifications, together with electrical engineers, were only categories in short supply.
New York, N. Y.	749	645	1,207	105	105	45	Registrations from chemical, civil and mechanical engineers boosted number of applications from November to January. However, heavy demand for electronic engineers continued because of the booming electronics and missile industries.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
Middle Atlantic Region: Cont.							
Newark, N. J.	176	196	296	102	148	40	Engineering applications declined due to increased activity in steel-using industries following return of steel workers to work. High demand for electrical engineers continues with largest number of openings in research, design and development.
Paterson, N. J.	94	87	146	68	53	51	Supply of applicants rose slightly between November and January. During period, demand centered around electrical and mechanical engineers.
Philadelphia, Pa.	309	336	447	13	17	129	Number of engineering job seekers has declined over the last four bimonthly periods. In January, supply and demand were well below year ago levels.
Pittsburgh, Pa.	176	192	340	30	27	17	Moderate change from November to January with a drop of 16 registrants, most of them in the fields of mechanical and electrical engineering.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
East N. Central Region:							
Cincinnati, Ohio	72	38	47	26	40	202	Cancellations of aircraft engine contracts resulted in a rise in active applications and a decline in demand. However, engineers are still being sought for research and development in electronics and optics for fire control, radar, sonar, and aeronautical, astronautical, and missile guidance systems.
Cleveland, Ohio	122	109	278	53	70	33	Supply of engineers increased although business has improved. Registrations of mid-year graduates brought up the total.
Columbus, Ohio	34	66	28	59	51	26	Only half as many engineers were seeking work through the Columbus local employment office in January as in November. Many aeronautical engineers recently released by aircraft producer left area to find suitable work. Expanding needs for electrical engineers is reflected in unfilled openings.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
East N. Central Region: Cont.							
Indianapolis, Ind.	26	19	27	19	25	24	Cutbacks in aircraft caused a rise in applications and decline in unfilled openings.
Chicago, Ill.	214	194	274	101	81	96	Engineering applicants, unlike those in scientific and technical occupations, rose in January from November. These applicants would encounter employment problems. A major deterrent in placing engineers is the requirement that prospective applicants not only have the requisite degree but also 2-3 years experience.
Detroit, Mich.	203	214	585	6	15	34	Improved economic conditions and out-migration of surplus engineers combined to reduce the number of registrations.
Milwaukee, Wis.	81	106	143	375	339	151	Supply shrank during the current period while demand showed greater strength. Rise in vacancies arising from greater emphasis on research, design, and development programs.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
West N. Central Region:							
Minneapolis-St. Paul, Minn.	137	65	143	169	178	123	Active applications doubled from November to January with most of increase in registrations from civil and mechanical engineers. Some of the job seekers were recent college graduates.
Kansas City, Mo.	27	18	19	5	5	24	No significant change.
St. Louis, Mo.	39	53	56	122	140	22	Little change in demand-supply relationship. Although some new entrants came into the labor market in January, the supply continued to lag behind demand. Greatest need is for electrical engineers, due in part to increasing activity in missile field.
South Atlantic Region:							
Baltimore, Md.	58	60	65	114	98	117	Little overall change in supply. However, more civil but fewer mechanical engineers registered in January than in November. Electrical engineering vacancies accounted for bulk of unfilled openings.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
South Atlantic Region: Cont.							
Washington, D. C.	206	104	95	279	158	379	Doubling of the supply of engineers was due to layoffs, real or anticipated, by firms in the area and environs.
Atlanta, Ga.	85	44	55	4	10	0	Cancellation of aircraft contracts resulted in a doubling of the number of job seekers and a reduction in demand.
East S. Central Region:							
Louisville, Ky.	11	15	29	1	5	3	A light demand for engineers in this area is reflected in a gradually diminishing supply.
West S. Central Region:							
New Orleans, La.	45	52	67	1	5	23	Failure of job seekers to keep their applications active accounted for bimonthly and over-the-year drop in supply.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
West S. Central Region: Cont.							
Dallas, Texas	91	73	188	43	122	65	Lessened needs of aircraft manufacturing firms resulted in a sharp contraction in unfilled openings. Reductions in force by aircraft and a slowdown in absorbtion by other industries increased surplus of industrial and mechanical engineers. Only shortage classification is electrical engineers.
Houston, Texas	97	87	155	17	32	10	Registrations by mining engineers accounted for increase in supply from November to January.
Mountain Region:							
Denver, Colorado	72	66	95	315	291	54	Increased activity of firms engaged in aircraft and missiles work reflected in increase in unfilled openings for electrical, industrial, mechanical, and aeronautical engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
Pacific Region:							
Seattle, Wash.	88	77	42	1,013	1,025	995	Labor market for engineers remains tight. Over-the-year increase in applications indicates a more selective attitude on the part of prospective employers and a trend toward requiring specific scientific capabilities and experience in the electronic categories. Electrical engineers with special "know how" in advanced electronics, who comprise bulk of unfilled openings, needed for work on missile and spacecraft projects.
Portland, Oreg.	47	54	62	11	13	15	Little change in demand-supply situation since November.
Los Angeles-Long Beach, Calif.	1,198	603	817	512	688	787	Demand for engineers eased because of the reorientation, stretch-out and cancellation actions in defense contracts in aircraft and electronics. Particularly affected were mechanical engineers, many with experience in tooling and design work in aircraft. In other engineering fields, especially civil, chemical and mining, the rise in applications was of a seasonal nature.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, January 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	
Pacific Region: Cont.							
San Francisco-Oakland, Calif.	205	188	270	44	49	55	Temporary break in relatively tight labor market for engineers emerged over the past two months. Primarily seasonal, other factors which have created the situation are: (1) Employers more cautious in planning for future expansion, partly due to contract cancellations. (2) Slowdown of hiring experienced at termination of steel strike. (3) Firms in process of weeding out inefficient workers.

NATURAL SCIENTISTS

Although the statistical data indicate an easing job market for scientists, informed observers see no letup in the demand for applicants who are highly qualified by education and experience. More emphasis was being placed by employers in the Boston area on scientists with advanced degrees. Milwaukee reported that many of the natural scientists openings specify doctors or masters degrees while Pittsburgh foresaw no decline in the need for scientists. There, companies were reported to be constantly on the lookout for research scientists, particularly with Ph.D. or masters degrees in the upper fifth of their class.

The increased supply of natural scientists in 30 areas between November and January comprised many without a degree. As a result, the proportion of scientists with degrees fell to an all-time low in January.

Natural Scientist Applicants
With College Degrees
in 30 Areas

Month	Applicants		Percent With Degree
	Number	With Degree	
Jan. 1960	713	525	74
Nov.	570	498	87
Sept.	699	619	89
July	708	599	85
May	620	530	85
March	613	517	84
Jan. 1959	626	486	78
Nov.	715	623	87
Sept. 1958	903	778	86

The largest number of applicants as well as the largest bimonthly increase in supply was reported by New York City, where 224 were registered in January. But only 60 percent of these had a college degree. The only other area with as many as 50 job seekers in January was the Los Angeles-Long Beach area.

The loosening labor demand-supply relationship is reflected in the ratio of active applications to unfilled openings. This rose to 2 to 1 for January as compared to a 1½ to 1 ratio for November.

CHEMISTS

The bright outlook for chemists continued into the beginning of 1960. This is evidenced not only by fewer job seekers at public employment offices but also by gains in unfilled openings at the end of the month.

The improvement is also mirrored in the ratio of applicants to unfilled openings. This fell to 2.6 to 1 for January from 3.2 to 1 for November. A year ago there were 7 applicants for each unfilled job.

The significant improvement in the overall employment picture for chemists prompted the American Chemical Society to issue an interim report on the employment outlook. It concluded that the prospect "appears better today than it has been at any time since early 1957."

Labor market area comments point up the improved job market for chemists. St. Louis reported a pickup in openings because of expansion in its chemical industry. Dallas stated that because there was little possibility for obtaining such personnel locally, employers were recruiting elsewhere. In Portland, increased opportunities led to a 50 percent drop in registrations in the past two months. The San Francisco-Oakland area reported a fairly active market for chemists, which would tighten by May with the resumption of seasonal food processing. But in sharp contrast to these, New York City pointed out that the chemist encounters employment difficulties. There is not enough of a chemical industry in the city to absorb all newcomers. The result is that recent college graduates, who are quite numerous, encounter difficulties in securing local employment.

DRAFTSMEN

The overall supply of draftsmen in January was more than adequate to meet requirements. The nearly 4,000 applications in January in the 30 labor market areas were up by almost 700 or 20 percent, from November, mainly because of reduced needs of the aircraft and construction industries.

The surplus of draftsmen was particularly marked in the Los Angeles-Long Beach area, where reductions in aircraft tooling work raised the number of job seekers from 520 in November to 870 in January. In New York City, cutbacks in government contracts forced the layoffs of draftsmen employed by job shops subcontracting work from airplane manufacturers. One large job shop had to furlough about 85 men working on instrumentation design for the now defunct B-70 airplane project. Other areas reported that the added supply represented draftsmen affected by the seasonal downturn in construction activity and the lesser qualified applicants who lack specialized knowledge and experience.

Despite the plentiful supply, certain types of draftsmen specialists were scarce. Houston noted that the supply is becoming rather critical, particularly in the case of piping draftsmen. In Portland, orders picked up, especially in the field of refrigeration, heating, and ventilating. Denver observed that draftsmen with piping, electrical and industrial plant experience disappeared from the surplus category.

While demand slipped slightly since November, more than 800 job openings remained unfilled at the end of the month in the 30 reporting areas. Special qualifications desired by employers account for some of the difficulty in filling jobs. Chicago reported that orders for draftsmen, in many instances, call for a degree, experience in heating and ventilating, or layout and design of hydraulic equipment.

Many areas indicated that the surplus of draftsmen is expected to be of short duration. The spring upturn in construction activity should enhance job opportunities.

LABORATORY TECHNICIANS AND ASSISTANTS

The labor market situation for laboratory technicians and assistants improved slightly between November and January. Active applications declined slightly, from 2,170 to 2,100. At the same time, the number of unfilled openings held fairly stable.

The best opportunities seem to be provided women in the biological, medical, chemical and technical designing and illustrating fields. An increasing number of women are also being used as laboratory technicians in industry and by non-medical research and engineering laboratories.

Medical technicians were in short supply in most of the 30 areas. Many vacancies in this field go unfilled because the hiring specifications are scaled too high for the caliber of the available supply. Applicants must not only be college trained but also registered technicians. For the 30 areas as a whole, only 15 percent of the registrants had college degrees.

The demand for laboratory technicians should increase by May, as food processing industries prepare for their peak period.

DIGEST

# of related information

Demand Trend for Engineers

A survey on trends in the demand for engineering graduates by the Engineering Manpower Commission indicated accelerating increases in requirements in the near future. The data were obtained from 394 companies and 111 governmental organizations (29 Federal, 36 State, and 47 Local). Fifteen graduates will be needed by 1966 for every 10 recruited in 1959. Other findings are:

1. Industrial recruiting and overall demand for engineers in 1959 increased materially over 1958. The net increase in the number of engineers employed by industry was more than double that in 1958 and would have been higher had sufficient supply been available.

2. The greatly increased supply of engineering graduates in 1958 (38, 162 B.S. graduates) over the past years precluded large numerical deficiencies of engineering manpower.

3. Demand for engineering graduates is expected to increase further in 1960 and continue to accelerate in the years immediately ahead.

4. Starting salaries for 1959 B.S. engineering graduates reached a new high--$510 monthly median for all industries. The median was much higher in certain industries: Electrical Equipment and Electronics--$523; Aircraft--$526. Median monthly salaries were $600 for M.S. graduates and $825 for Ph.D.'s.

5. Engineering turnover in 1958 averaged 9.5 percent, a decline over 1957 (11 percent) and is expected to drop to 8.6 percent in 1959. The principal cause for losses is resignation (55 percent), followed by death and retirement (9 percent), military leave (6.5 percent).

6. Demand for engineering technicians in 1959 also increased over 1958. Industrial employers expected to hire in 1959 one technician for every 10 now employed, while in-plant training of additional technicians also corresponds to about 10 percent of the employed number.

Demand for Engineers - 1959
Engineering Manpower Commission
of Engineers Joint Council
December 1959

Federal Government Boosts Salaries to Attract Engineers and Scientists

The Federal Government is raising the minimum entrance rates for engineers and scientists by $450 a year to better its competitive situation in recruiting in these shortage-category fields. The government hopes that the higher salary will help in recruiting about 3,200 engineers and 1,200 scientists during the next year.

A survey by the Civil Service Commission showed a decrease in acceptance rates by persons offered Federal employment in these shortage occupations, and a widened gap between industry's median starting pay and the rates government agencies could offer for these jobs. Evidence is also accumulating that private employers will offer still higher salaries to June 1960 graduates in these shortage fields.

While the 1959 engineer-scientist acceptance rate--the percent of acceptance to firm offers of appointment--declined for both government and industry recruitment, the decrease was greater for government than industry. Industry's acceptance rate in 1959 dropped only three percentage points--from 46 percent in 1958 to 43 percent in 1959, while government's acceptance rate fell by five percentage points--from 40 percent in 1958 to 35 percent in 1959. The Commission pointed out the government's experience actually was less fruitful than the statistics reflect. Many of the top quality engineers and scientist candidates interviewed by Federal recruiters indicated their disinterest, primarily because of salary, even before an offer of appointment could be made. Therefore, these were not recorded in the acceptance-declination tabulation.

U. S. Civil Service Commission
News Release, March 25, 1960

Employment Opportunities Approach New High For Chemists and Chemical Engineers

The employment outlook for chemists and chemical engineers seeking new positions appears better today than it has been at any time since 1957. Records, all of them favorable to the job-seeking chemist and chemical engineer, were set in the National Employment Clearing House operated at the Atlantic City meeting of the Society in September. Employer use of the ACS Regional Employment Clearing House in 1959 promises to set a new high. More situation-open ads were placed by employers in Chemical and Engineering News in 1959 than in any previous year. Starting salaries rose three percent over 1958 figures, and unemployment is at a low level.

David A. H. Roethal
American Chemical Society
"Employment Outlook: Bright"
Chemical and Engineering News
December 28, 1959

Engineer Recruitment

Recruiting, though intensively competitive, is considerably more respectable than it was a few years ago. Dignity and prudence are now the watchwords, according to a Product Engineering Survey. Industry realized two or three years ago that widespread pirating, auction-block bidding and luxurious entertainment did the industry no good.

Finding engineers is the main problem. Once they are hired, they generally stay on the job. Fewer than one engineer in ten will change jobs in 1960. He'll change for a better working atmosphere, a more challenging assignment; he'll probably not be offered much more money.

Lower turnover is explained by a variety of values and inducements. A growing company is an attraction. Variety of work and mobility within a company are other inducements. Fringe benefits are a factor. Engineers take root in a section of the country and are immune to the promises of a bright future elsewhere. A more realistic approach to interviewing is cited. Where economic factors are the lure, particularly on executive levels, the bait must be good.

The cost of recruiting varies widely--depending on how scarce the talent. One company spent $20,000 advertising for a man with special experience--and never got him. The cost of finding a civil or chemical engineer may run as low as $200 to $300. Companies surveyed by Product Engineering reported costs averaging between $1,000 and $1,500.

A few years ago, jobs for engineers were advertised in vague glowing terms. Now the ads emphasize technical opportunity and give facts about specific projects--a more effective approach to fact-conscious engineers. Engineers, and their decision-sharing wives, are also interested in community facilities--particularly schools; ads now describe such facilities. Some companies publish brochures describing what the area has to offer.

Product Engineering
November 2, 1959

Engineer Recruiting at Convention of the Institute of Radio Engineers

The annual hunt for dissatisfied electronics engineers was on in New York City with the opening, March 21, 1960, of the yearly convention of the Institute of Radio Engineers.

Recruiting agents generally felt that the bidding for talent in the intensively competitive field was as aggressive as it had been last year. They agreed, however, that it was less flamboyant than the recent year. The demand for talent was becoming more specialized with the shift in emphasis to "chiefs rather than Indians." Nevertheless, one agent for a new company indicated an interest in all kinds of electronics engineers.

Engineers contemplating a change in jobs were reported to be most concerned with "a greater challenge" and "more opportunity to grow." More money and a specific location appeared to be lesser incentives.

Recruiting efforts were on a mass-production basis at a career center, which is operating as a clearing house to arrange interviews with representatives of 27 companies. Five-hundred persons had registered at the center by the end of the first day.

New York Times
March 22, 1960

How Real is the Engineer Shortage?

Starting salaries are being driven upward by the increases in demand over supply of engineering talent, and the shortage is fostering job-changing of experienced engineers.

One estimate is that there are 85 times as many jobs for scientists and technicians as there were 80 years ago, but only five times as many workers in the total labor force.

A shortage of engineering and scientific personnel has existed for some years, and there is little reason to believe that it will cease in the foreseeable future. The situation is made more critical by the serious decline in recent years in the number of young persons reaching the age when it might be reasonable to expect them to enter engineering and science.

The picture is not so dismal that there is no hope. Increased efficiency in personnel usage can alleviate some of the difficulties. A more enlightened management will encourage more engineers to stay in their fields--and to advance in them.

The Management Review
October 1959

Chemists' Salaries Vary in New York

The entry wage for inexperienced college graduates is generally between $75 and $90 a week, and the completion of graduate work in chemistry is a prerequisite for advancement in the field. The chemist who has a masters degree may earn $5,500 to $6,000 a year, while the Ph.D.--usually with administrative duties--should receive $8,000 or more a year.

Most of the job opportunities in New York City for chemists who wish to work for industrial establishments are for those with specialized experience.

Medical research centers, hospitals, and research projects conducted by the universities provide greater employment opportunities in New York for the chemist with little or no experience.

Industrial Bulletin
January-February 1960

Shortage of Research Talent in Metallurgical Engineering

Research and development work in metallurgy has been largely undernourished in the United States, claims Dr. Robert F. Mehl, consultant for the United States Steel Corporation.

In an address February 16, 1960, before the American Institute of Mining, Metallurgical and Petroleum Engineers, Dr. Mehl suggested that shortages of research talent could be eased if research specialists were not lured into administrative work. He urged more companies to find the means of rewarding researchers in pay and prestige without "promoting" them into relatively uncreative assignments.

New York Times
February 17, 1960

Engineer Search Will Get Tougher

Efforts to find engineering talent will get harder, not easier. The Engineering Manpower Commission of the Engineers Joint Council points out why: In the next five years, about 37,500 engineers will graduate each year. This compares with previous predictions of close to 43,000 a year. At the same time, by 1966 more than two engineers will be hired for every one employed this year.

The Iron Age, January 28, 1960

Federal Pay Plan for Engineers and Scientists

A plan which would enable the Federal government to recruit and retain adequate numbers of engineers and scientists has been recommended to the House of Representatives Civil Service Committee by the National Society of Professional Engineers. High points of the plan are:

1. That agency heads be empowered to fix starting salaries for scientists and engineers in line with prevailing rates in industry.

2. Removal of the artificial distinction between the so-called "super grades," GS-16, 17 and 18, and the other 15 GS grades, and elimination of the legal limitation on the numbers of such positions.

3. The rewarding of outstanding ability, merit, job performance and responsibility through adequate salary adjustments.

A Federal salary system attuned to changing market conditions is absolutely essential, the Society said, if the government is to achieve a permanent, lasting solution.

Washington Post
February 14, 1960

A Professional Program for the Engineering Graduate

The first five years after graduation from college are the most critical period in a young engineer's career. He often misses out on important opportunities to develop himself professionally because of confusion or inertia. To prevent the "post-college slump," the Training Committee of the Engineers' Council for Professional Development sponsors a program by which experienced engineers help their young colleagues along the way to professional stature. The program includes the following activities:

1. Orientation and Training in Practice. The Training Committee tries to foster better orientation courses for new engineers and urges that they be kept gainfully employed from the outset of their employment.

2. Continuing Education. The Training Committee encourages formation of evening study courses--with or without credit--for the young engineer.

3. Professional Identification. The young engineer is encouraged to join the engineering society that covers his branch of the profession, to participate in its activities, to seek professional registration in his State of residence, and to conduct himself like a professional man at all times.

4. Responsible Citzenship. The young engineer is encouraged to put his roots down in the community in which he lives, to participate in community activities, and to take his place as a respected and responsible citizen.

5. Selected Reading. The Training Committee has recommended reading lists covering subjects ranging from physics to poetry, recognizing that the successful engineer has to be broader than his specialty.

6. Personal Appraisal. The young engineer is encouraged to look at himself in order to ascertain where he stands on the road to his personal goal.

Electrical World
November 2, 1959

Graduates Receive Higher Offers

The 1960 graduating class of Case Institute of Technology has received job offers averaging $525 per month, according to Dale Barbee, Director of Student Aid and Placement. Salaries offered the class of 1959 averaged $501. Mr. Barbee expects the $525 figure to be higher by graduating time, since all offers have not yet been made.

Graduates in electrical engineering were tied for highest average salaries with $532 per month. In third place were mechanical engineers with $531. Job offers at $527 a month were received by physics majors.

Wall Street Journal
April 4, 1960

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is the Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas [1] for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

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[1] The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 32.

List of 30 Major Labor Market Areas by Regions

New England:

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Newark, New Jersey
Paterson, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Indianapolis, Indiana
Chicago, Illinois
Detroit, Michigan
Milwaukee, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
Kansas City, Missouri
St. Louis, Missouri

South Atlantic:

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Dallas, Texas
Houston, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-March 1960

Month and Year	All Occupations	Professional & Managerial	Selected Occupations 1/				
			Total	Engineers	Scientific	Draftsmen	Technicians
Jan. 1956	27,887	12,845	6,803	4,792	435	1,361	215
Jan. 1957	35,629	14,498	8,993	6,349	389	1,988	267
March	34,390	15,952	9,300	6,428	732	1,851	289
May	31,452	14,007	8,404	5,976	576	1,591	261
July	29,144	11,879	7,407	5,437	590	1,174	206
Sept.	23,208	8,986	5,480	3,946	569	791	174
Nov.	13,859	5,388	2,879	1,993	294	384	208
Jan. 1958	14,665	7,726	2,582	1,817	245	315	205
March	14,451	8,244	3,496	2,717	398	204	177
May	15,552	9,439	3,505	2,764	330	244	167
July	14,420	7,514	3,540	2,921	233	212	174
Sept.	15,363	8,732	5,303	4,447	431	255	170
Nov.	17,661	9,308	4,789	3,906	475	243	165
Jan. 1959	16,042	10,530	5,426	4,386	489	377	174
March	17,960	10,820	5,473	4,278	576	391	228
May	23,232	12,828	5,635	4,387	602	402	244
July	20,559	10,112	5,315	4,128	486	495	206
Sept.	21,414	10,140	6,320	5,096	500	548	176
Nov.	21,101	11,740	6,585	5,193	600	616	176
Jan. 1960	19,735	11,834	5,817	4,389	648	605	175
March	21,286	12,611	5,167	3,927	587	442	211

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis

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1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Table II. Clearance Openings in Selected Occupations 1/
January 1960, November 1959, and January 1959

Occupation	Jan. 1960	Nov. 1959	Jan. 1959	Percent Change to Jan. 1960 from: Nov. 1959	Percent Change to Jan. 1960 from: Jan. 1959	Percentage Distribution Jan. 1960
All selected occupations	5,817	6,585	5,426	-11.7	+7.2	100.0
Professional						
Engineers, total	4,389	5,193	4,386	-15.5	+0.1	75.5
Metallurgical	43	46	35	a/	a/	0.7
Chemical	98	87	87	+12.6	+12.6	1.7
Civil	218	210	676	+3.8	-67.8	3.7
Electrical	2,532	2,727	1,746	-7.2	+45.0	43.5
Industrial	225	388	179	-42.0	+25.7	3.9
Mechanical (exc. aero.)	1,055	1,094	937	-3.6	+12.6	18.1
Aeronautical	216	641	722	-66.3	-70.1	3.7
Mining	2	0	4	a/	a/	b/
Other professional	648	600	489	+8.0	+32.5	11.1
Natural scientists	468	468	400	n.c.	+17.0	8.0
Physicists	234	240	177	-2.5	+32.2	4.0
Mathematicians	159	150	161	+6.0	-1.2	2.7
Statisticians	2	3	6	a/	a/	b/
Life scientists	51	53	30	-3.8	+70.0	0.9
Earth scientists	22	21	26	a/	a/	0.4
Chemists	180	132	89	+36.4	+102.2	3.1
Semiprofessional						
Draftsmen, total	605	616	377	-0.2	+60.5	10.4
Mechanical	266	257	120	+3.5	+121.7	4.6
Other	339	359	257	-5.6	+31.9	5.8
Laboratory technicians and assistants, total	175	176	174	-0.6	+0.6	3.0
Medical technicians	136	152	149	-10.5	-8.7	2.3

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a/ Percent change not shown where both absolutes are less than 50.
b/ Less than 0.05 percent.

n.c.--no change.

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations January 1960, November 1959, and January 1959

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959
Total..............	678	705	856	713	571	626	3,982	3,319	6,748	2,101	2,170	2,925
Boston..............	23	26	38	23	20	6	213	146	154	66	79	188
Providence..........	4	6	19	1	4	2	23	30	45	22	26	34
Buffalo.............	8	17	21	7	15	8	27	66	105	66	66	86
New York............	221	182	254	224	119	136	809	650	1,317	241	354	366
Newark..............	39	55	59	24	28	22	48	64	173	105	117	113
Paterson............	11	14	32	7	11	7	61	52	92	41	59	63
Philadelphia........	37	31	30	21	19	20	314	302	508	158	169	219
Pittsburgh..........	14	22	38	14	11	24	199	221	609	145	144	378
Cincinnati..........	9	4	2	3	1	8	66	43	54	61	35	53
Cleveland...........	14	11	19	3	9	9	75	83	329	58	37	88
Columbus............	4	4	3	4	2	3	21	36	25	9	15	13
Indianapolis........	4	2	4	0	2	1	19	16	25	22	17	22
Chicago.............	32	49	55	10	13	14	117	137	335	101	118	101
Detroit.............	11	18	22	4	5	7	89	128	814	44	52	158
Milwaukee...........	19	15	24	17	17	28	13	15	88	12	12	47
Minneapolis-St. Paul.	11	18	11	19	14	23	88	57	158	29	35	50
Kansas City.........	8	5	2	0	1	3	33	17	17	18	11	12
St. Louis...........	2	10	10	9	12	9	36	45	69	38	54	64
Baltimore...........	11	12	13	2	5	3	58	48	67	24	31	41
Washington..........	27	26	17	46	60	31	110	60	71	54	35	58
Atlanta.............	6	7	2	7	4	3	99	51	28	31	20	29
Louisville..........	6	5	1	2	4	1	22	20	33	18	27	31
New Orleans.........	3	8	13	30	14	15	41	49	44	21	19	31
Dallas..............	4	6	5	21	20	19	75	48	150	24	28	32
Houston.............	13	12	20	34	23	46	80	81	193	63	42	69
Denver..............	9	5	9	51	25	17	38	37	43	71	60	35
Seattle.............	11	7	11	5	5	3	63	75	44	31	30	29
Portland............	8	16	11	7	13	12	44	34	42	38	37	42
Los Angeles-Long Beach	78	81	66	85	67	108	870	520	832	374	304	319
San Francisco-Oakland.	31	31	45	33	28	38	231	188	284	116	137	154

Table IV. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, End of Month, January 1960, November 1959, and January 1959

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959	Jan. 1960	Nov. 1959	Jan. 1959
Total...............	258	221	122	329	368	421	815	875	602	425	411	386
Boston...............	4	7	8	5	9	27	82	114	155	66	56	53
Providence...........	3	2	0	0	0	0	4	4	1	3	2	3
Buffalo..............	15	9	5	8	16	47	48	6	5	23	13	10
New York.............	30	26	30	16	10	10	88	85	24	74	66	69
Newark...............	35	38	3	5	3	1	20	50	77	36	24	7
Paterson.............	0	3	2	2	7	2	10	20	15	5	7	2
Philadelphia.........	0	0	0	0	0	0	11	10	11	5	7	17
Pittsburgh...........	7	14	3	4	4	5	14	21	7	2	3	5
Cincinnati...........	10	9	0	2	0	2	5	9	5	15	9	5
Cleveland............	6	6	9	0	0	1	22	27	7	6	10	10
Columbus.............	3	3	1	1	1	1	15	17	5	3	3	5
Indianapolis.........	1	2	3	0	2	1	2	7	2	3	4	3
Chicago..............	28	17	8	1	0	13	47	44	42	15	16	26
Detroit..............	0	0	1	0	0	0	7	13	18	2	5	4
Milwaukee............	11	9	6	107	104	14	130	122	32	22	18	15
Minneapolis-St. Paul..	24	13	9	10	19	13	63	48	34	14	13	14
Kansas City..........	0	1	2	0	0	1	1	2	5	4	3	3
St. Louis............	10	9	0	0	6	0	17	20	1	9	11	11
Baltimore............	1	1	1	1	1	2	8	22	10	4	13	3
Washington...........	12	7	0	44	46	18	18	43	16	28	33	34
Atlanta..............	1	1	0	1	0	0	0	2	0	0	1	2
Louisville...........	4	3	1	1	0	0	0	2	2	1	0	0
New Orleans..........	0	0	0	0	0	0	1	0	4	1	0	0
Dallas...............	1	1	1	0	2	1	14	10	16	3	4	1
Houston..............	2	1	0	2	1	1	21	1	4	4	0	3
Denver...............	1	0	0	8	17	1	24	21	3	17	23	8
Seattle..............	2	2	0	61	50	227	4	9	4	2	0	7
Portland.............	3	0	0	1	1	0	12	9	4	2	2	4
Los Angeles-Long Beach	40	32	28	45	63	30	100	107	76	19	41	34
San Francisco-Oakland.	4	5	1	4	6	3	27	30	17	37	24	28

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CURRENT
LABOR MARKET CONDITIONS
in
ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

MAY 1960

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary
BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director
Washington 25, D. C.

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CURRENT LABOR MARKET CONDITIONS

in

ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

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Washington 25, D. C.

Office of Program Review and Analysis

Louis Levine, Deputy Director, Bureau of Employment Security

This bimonthly report is prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor, for the National Science Foundation. It is based on field reports on current conditions in 30 major labor market areas, statistics on job openings for selected engineering, scientific and technical occupations placed in inter-area clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources. This study was prepared by Benjamin Goldstein, with the assistance of Donald E. Beatty.

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Trend Indicators

UNIVERSITY RECRUITMENT--JOB OPPORTUNITIES, SALARIES UP: Job market for graduates characterized as better than last year. In the Boston area, Tufts School of Engineering reports that graduates with a B. S. degree will be starting to work at about $550 a month, while liberal arts students with no experience are being offered from $4,800 to $5,300 a year. The greatest demand is for students in the fields of engineering, mathematics, physics, and business. At Boston University, the B.S. graduates in technical fields are being offered salaries ranging from $450 to $550 a month, with the average running around $500. . . . In the Paterson area, Stevens Institute of Technology was expecting representatives from 230 companies to interview 216 seniors as prospective employees. . . . Philadelphia reports no recent graduates available and plenty of job offers for this year's graduates. . . . From Houston, indications are that college job recruitment has increased considerably over the past 18 months. . . . And from San Francisco-Oakland: The University of California indicated that an increased number of firms are sending recruiters to the campus and are offering salaries in the vicinity of 5 percent higher than last year.

GIFTED TECHNICAL STUDENTS SOUGHT BY EMPLOYERS: A Business Week survey disclosed a sensational demand for the outstanding technical student; and adequate but unspectacular market for the average student. While the two markets have existed for a long time, the line between them is sharper than usual for a prosperous year. Reports from various areas support the findings by Business Week. Baltimore states: In the engineering field the demand has been for recent college graduates without work experience but with high scholastic performance. . . . From San Francisco-Oakland: One peninsula electronics firm has indicated that while not intending to hire any more graduates than last year, it is spreading its efforts to cover a larger number of campuses than before, in an attempt to obtain higher quality graduates.

OTHER DEVELOPMENTS: Increasing attention being centered on recruitment and placement of executive, administrative, and scientific personnel. . . . Anticipating the increasingly substantial contribution women will make in the field of scientific and technical work, the Massachusetts Institute of Technology is constructing its first dormitory for women students. . . . As the atomic age advances, needs for electronic engineers, scientists, and technicians arise in a wide variety of industries. The construction of naval vessels with nuclear propulsion units by shipyards means that they will be seeking specialties such as electronic and nuclear engineers, electronic engineering and physical science aides.

GROWTH IN MEDICAL TREATMENT AND RESEARCH requires large numbers of medical technologists and technicians. Academic standards for qualification are high. Medical technologists generally required to be affiliated with American Society for Clinical Pathology.

SPONSORED RESEARCH AT UNIVERSITY PROVIDES INTERNSHIP FOR STUDENTS: Outlays for sponsored research at M. I. T. last year were three times as great as the academic budget. Hundreds of graduate students work as research assistants on sponsored projects in their fields at the Institute and receive $250 to $300 a month, thus receiving a kind of engineering internship and residency.

SPACE-AGE RESEARCH CALLS FOR UNUSUAL ABILITIES: The new space-exploration specialties call for ever more complex jobs, such as bio-astronautics, astrionics, astrodynamists, radio biologists, anthropometrists (to measure the functional capabilities of man) and astrobotanists. These scientific specialties concerned with space activities are not contained in the Dictionary of Occupational Titles. The jobs are so highly specialized and the individuals qualified to fill them are so scarce that they are not commonly placed regularly with either public or private agencies, even of the highest caliber. The graduate students at universities are the prime sources of supply for the private and military organizations which work hand in glove with the universities in their research and development projects.

EMPLOYER PRACTICES IN MEETING MANPOWER SHORTAGES

Apprentice training programs: A formal apprenticeship training program provided draftsmen trainees with more than 10,000 hours of actual on-the-job experience plus some 1,400 hours of related classroom studies. A major electronics firm in the Boston area now has 181 employees enrolled in various stages of the program, and some 80 new trainees will be brought in during 1960. The apprentices are paid for classroom hours as well as for time actually spent at work. Rates begin at $1.50, and through a series of progressive steps, the students reach journeymen pay levels ranging from $2.40 to $3.00 an hour.

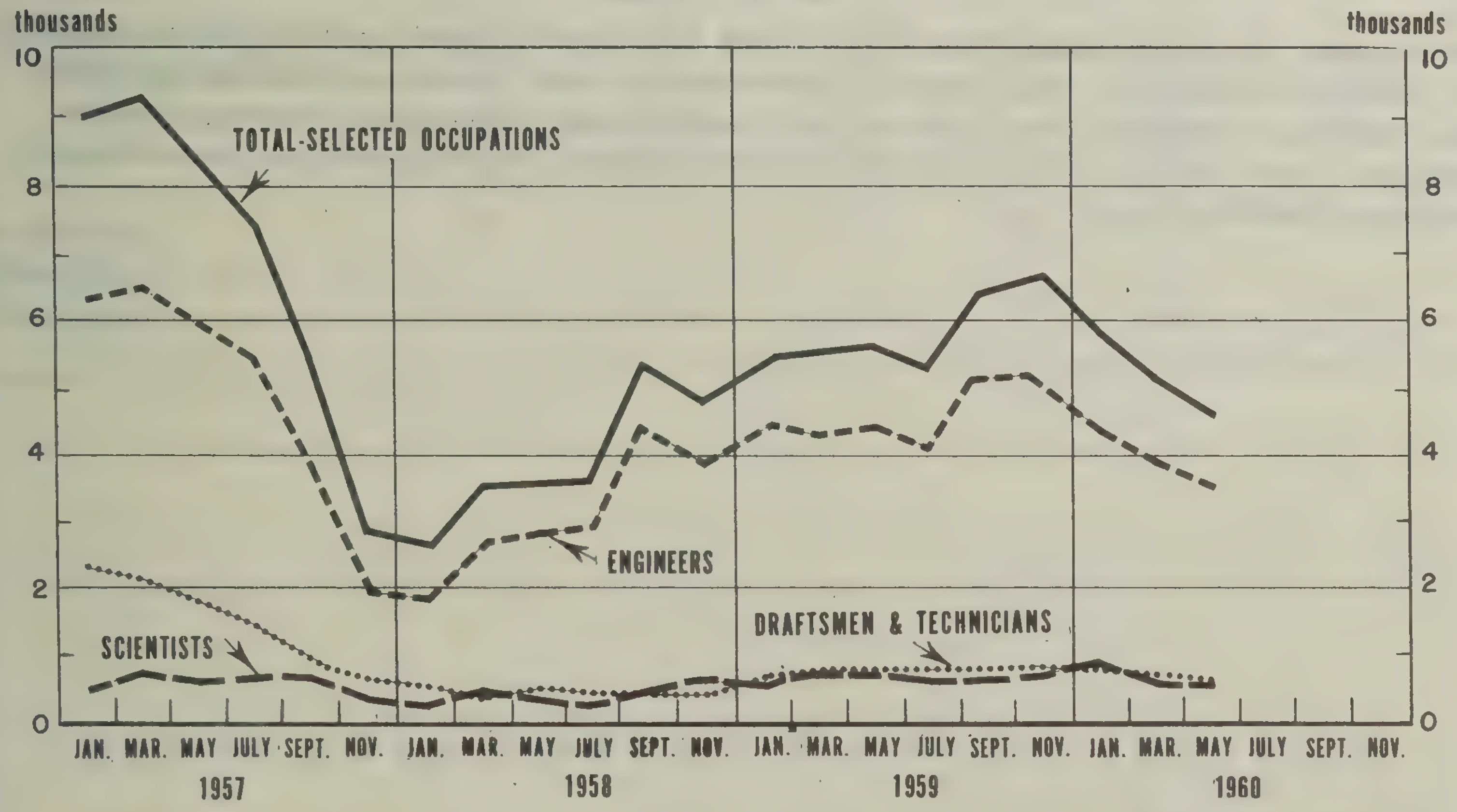
Educational assistance programs, sponsored by firms in the Boston area, continue to expand. Company support ranges from aid to potential Ph.D.'s to training of technicians and aides.

Training women. An electronic data-processing equipment manufacturer is seeking female engineering clerks, with or without experience, to be trained at a starting rate of $53.00 a week. . . . A transistor manufacturer is seeking female electronic technicians and "wiremen" to wire and assemble the chassis of test kits and electronic control units.

recent developments in

INTERAREA RECRUITMENT

Job openings in interarea clearance in engineering, scientific, and technical occupations fell again in May. This marked the third successive bimonthly downturn in these selected local occupational shortages. Since the high for 1959 of 6,585 vacancies in November, clearance listings have dropped by almost 2,000, or 29 percent. In all of the occupations covered by this report, listed job needs which could not be filled locally totaled 4,700 in May, a drop of 460, or 9 percent, from March. These reductions, extending to all major groupings, were numerically greatest in the engineering category, which accounted for about three-fourths of the bimonthly job loss. May clearance needs were less numerous than in any bimonthly period of 1959 although well above the low levels prevailing during the spring of 1958.



TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957-1960

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

Engineering vacancies, which accounted for three-fourths of the openings in the selected occupations, declined by almost 350 between March and May 1960. All engineering groups were down from March levels, with the major numerical reductions occurring in the electrical and mechanical subgroups. The decline in vacancies for electrical engineers was largely in the States of Florida, New Jersey, and Pennsylvania where openings were withdrawn for engineers experienced in radar and computer systems, while the withdrawals for mechanical engineers were centered in California and Wisconsin. While the number of vacancies in the electronic and electrical engineering classification was the lowest since March 1959, these listings still accounted for more than half of the engineering manpower shortages.

Reduced clearance listings for mathematicians for work on computers in Florida caused most of the decline in job openings for natural scientists. Listings for physicists showed little overall change between March and May, despite the removal of a number of vacancies in the communication equipment industry in California for work on guidance and control systems for missiles.

Fewer vacancies were posted for chemists and chemical engineers in May than in March, but the job market for these groups of workers has improved considerably over the year. These workers have made the best over-the-year gains in job listings.

Vacancies for draftsmen were down from the March level principally because of the withdrawal of openings by government and the aircraft industry in California. Demands for laboratory technicians continued virtually unchanged from March. Most of the needs in this classification are for medical technicians.

Number of Nonagricultural Job Openings in Selected Occupations in Interarea Clearance at Public Employment Offices, U. S. Total, May and March 1960, and May 1959

Selected Occupations	Job Openings			Change to May 1960 from:			
				March 1960		May 1959	
	May 1960	March 1960	May 1959	Number	Percent	Number	Percent
All Selected Occupations	4,710	5,167	5,635	-457	-8.9	-925	-16.4
Engineers, total	3,589	3,927	4,387	-338	-8.6	-798	-18.2
Chemical	141	144	97	-3	-2.1	+44	+45.4
Civil	237	238	364	-1	-.4	-127	-34.9
Electrical	1,805	1,986	1,910	-181	-9.1	-105	-5.5
Industrial	228	242	231	-14	-5.8	-3	-1.3
Mechanical (ex.aero.)	861	969	909	-108	-11.2	-48	-5.3
Aeronautical	271	303	818	-32	-10.6	-547	-66.9
Selected Scientific Occupations	550	587	602	-37	-6.3	-52	-8.6
Natural Scientists	379	404	513	-25	-6.2	-134	-26.1
Physicists	208	210	200	-2	-1.0	+8	+4.0
Mathematicians	112	140	196	-28	-20.0	-84	-42.9
Other	59	54	117	+5	+9.3	-58	-49.6
Chemists	171	183	89	-12	-6.6	+82	+92.1
Draftsmen	364	442	402	-78	-17.7	-38	-9.5
Laboratory technicians	207	211	244	-4	-1.9	-37	-15.2

CURRENT TRENDS IN LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

The job market for engineers, scientists, and technical personnel, which had eased in January, failed to recover in March. Nevertheless, persistent shortages continued to be reported in these occupations and some growing demands were evident in selected areas, notably in space-age research. Various factors contributing to the weakness in January--such as slashes in manned aircraft production and the slack in the construction engineering fields--also continued to operate in March. In addition, March witnessed significant layoffs by some automobile producers. Reflecting these developments, registrants at public employment offices in these occupations in March numbered 14,120, an increase of 1,900, or 15 percent, from January.

Of the occupational groups covered by this report, draftsmen and engineers were particularly affected by the downturn in automobile and aircraft production. They accounted for over three-fourths of the rise in the number of job seekers from January to March.

The most active demand among engineers continued to be in the electrical category, with some of the urgency in the requirements having eased. The proportion which electrical engineering vacancies comprised of all unfilled openings fell to 50 percent in March from 61 percent in January.

The demand for drafting personnel in March continued at about the January level although there was an increased supply at public employment offices in the 30 reporting areas. Many job seekers were particularly interested in openings for mechanical draftsmen whereas shortages were being reported for process piping, architectural, and electronics draftsmen.

The favorable job market for chemists continued. Demands in this classification were higher than in January. Needs for natural scientists did not change markedly during the same period, with the principal demands reported for physicists and mathematicians.

There was no easing of the persistent shortage of medical technicians. The growth of medical research and hospital building programs has intensified the needs for registered technicians.

ENGINEERS

The job market for engineers, which began to slacken in January, continued to ease in March despite the growth of space-age research in some areas. Cutbacks in military aircraft production in several centers as well as softening in the construction engineering field contributed to a reduced demand as well as an increased supply of engineers. Other factors which contributed to reduced needs in engineering occupations in the surveyed areas were curtailments at some automobile plants, a long strike at a Boston shipyard, and the relocation of demand resulting from the establishment of new facilities just outside the Boston area boundaries. Indicative of the easing market was a drop of about 500, or 14 percent, from January to March in the number of jobs available for engineers as shown by unfilled openings in the 30 major reporting labor market areas. At the same time, the supply of engineers in these areas also rose by over 500, or about 11 percent.

An increased number of registrants was reported in March than in January in each engineering category, except mining. The largest numerical upturns were in the mechanical, industrial, and electrical categories.

Number of Engineering Job Applicants
March 1960, January 1960, and March 1959

Engineering Specialty	Active Applications			Change to March 1960 from:			
				Jan. 1960		March 1959	
	March 1960	Jan. 1960	March 1959	Number	Percent	Number	Percent
Engineers, total	5,479	4,948	5,903	+531	+10.7	-424	-7.2
Metallurgical	96	75	97	+21	+28.0	-1	-1.0
Chemical	282	270	367	+12	+4.4	-85	-23.2
Civil	997	963	1,151	+34	+3.5	-154	-13.4
Electrical	786	704	927	+82	+11.6	-141	-15.2
Industrial	872	764	1,072	+108	+14.1	-200	-18.7
Mechanical	2,121	1,867	2,124	+254	+13.6	-3	-0.2
Aeronautical	269	236	102	+33	+14.0	+167	+163.7
Mining	56	69	63	-13	-18.9	-7	-11.1

The changes in active registrations by engineers varied among the 30 areas, with a majority showing increases in supply. Among localities with substantial upturns in the number of job seekers, the Los Angeles-Long Beach area, with about 400 more applicants in March than in January, headed the list. Most of these were in mechanical, industrial, and electrical specialties and had been affected by layoffs resulting from reduced activity in the design, development, and production of manned aircraft. The Detroit area had the second largest increase in engineering job applicants with a rise of slightly more than 100 over January. Most of this upturn was caused by layoffs in some automobile plants.

On the other hand, New York City showed a decline of over 100 registrants, chiefly in mechanical, civil, and electrical categories, because of increased demand for research and design engineers and a seasonal pickup in construction. In the Newark area, which had a drop of about 80 job seekers, the decline was attributed to out-of-area recruitment of engineers rather than to local increases in employment.

The drop in demand in the 30 areas, as indicated by unfilled openings, was largely confined to electrical and electronics engineers and was centered in three areas. In the Seattle area, slashes in Bomarc production resulted in a sharp drop of 450 unfilled openings for electrical engineers, while in the Los Angeles area the steady decline in aircraft continued with appreciably reduced needs for engineers. Unfilled openings for electrical engineers were also off sharply in Boston, with most of the decline, however, reflecting relocations of demand resulting from the opening of new satellite plants just outside the area boundaries.

Despite the reduced number of unfilled openings for electrical engineers, supply inadequacies were highlighted in many areas, including Newark, Paterson, Buffalo, New York City, Milwaukee, Dallas, and San Francisco-Oakland. In the Newark area, needs were reported in research, design and development of electrical equipment for computers, radar and missile guidance systems, and for transmission and receiving devices. In the San Francisco-Oakland area, electrical engineers experienced in the design of lighting and power equipment were sought.

Demands for civil engineers also eased seasonally from January to March, with the drop, however, merely a fraction of that reported for electrical engineers. For the 30 areas combined, the number of unfilled openings for civil engineers was off by only 30 in March from the January total of about 210. Nevertheless, the job market was not too favorable for these engineers. Many areas commented that civil engineers did not pose any supply problem, with continued cutbacks making more workers available in

Boston, Dallas, New Orleans, and Seattle. In the San Francisco-Oakland area, a slash in gas tax revenues and seasonal slack in demand, are causing some civil engineers to face significant employment problems. This has prompted the comment that "of all the engineering categories, the civil engineer is in the least enviable position." A seasonal rise in construction and highway engineering, however, may absorb some of the local surplus.

In contrast to the downturn in job opportunities for electrical and civil engineers, demands for mechanical and aeronautical engineers rose from January to March, largely in response to modifications in program requirements in the aircraft industry.

Area Trends

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
Summary, 30 Areas	5,479	4,948	5,903	3,354	3,888	3,554	The dominant trend at the close of the first quarter of 1960 was slackening in the demand for engineers although growth in space-age research increased needs in some areas; nevertheless, sizable shortages persisted. In the 30 areas, the actual volume of jobs available for engineers, as indicated by unfilled openings, dropped by one-seventh from January to March 1960; while the number of job seekers rose by over one-tenth. Cutbacks of considerable depth in military aircraft in several centers as well as slack in the construction industry contributed to easing of demand. Auto layoffs were also a contributing factor.
New England Region:							
Boston, Mass.	201	166	258	77	223	187	Temporary easing in labor demand-supply situation. Unfilled openings fell, as local industry concentrated expansion in new facilities just beyond the boundaries of this area. Continued cutbacks in civil engineering field have made more engineers available.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
New England Regions: Cont.							
Providence, R. I.	40	31	80	6	3	6	Unfilled needs for engineers persist despite slight increase in active applications. Most of the new applicants were employed individuals seeking information about other job opportunities.
Middle Atlantic Region:							
Buffalo, N. Y.	82	82	155	79	57	86	Demand-supply relationship in numerical balance. Job orders received and openings unfilled at end of month increased while the number of active applications was the same as in January. Shortages of metallurgical, chemical, and electrical engineers persisted but supply of aeronautical engineers shifted to surplus in March.
New York, N. Y.	656	763	926	104	105	56	Surplus of civil engineers began to decrease as demand for designers picked up. In March, applications from mechanical and electrical engineers also dropped. Although unfilled openings were unchanged from January, openings received and in clearance rose. Increased emphasis on science and research has increased the demand for research and design engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications March 1960	Active Applications Jan. 1960	Active Applications March 1959	Unfilled Openings at end of: March 1960	Unfilled Openings at end of: Jan. 1960	Unfilled Openings at end of: March 1959	Comments
Middle Atlantic Region: Cont.							
Newark, N. J.	97	176	260	76	102	45	Sharp drop in registrations extended to all classifications except aeronautical; latter increase due to special local office recruitment. Decline in supply not attributable to increase in local employment in these classifications but due to continued recruitment in this area by employers from other sections of the country.
Paterson, N. J.	97	94	120	64	68	42	Scattered layoffs resulted in slight rise in applicants. However, demand remained strong with severe shortage of electronics engineers.
Philadelphia, Pa.	329	309	473	24	13	160	Demand for mechanical engineers has increased during period; tight situation also reported for chemical engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
Middle Atlantic Region: Cont.							
Pittsburgh, Pa.	159	176	296	51	30	23	Hiring of engineers adversely influenced by failure of employment situation to improve. Nevertheless, area experienced some shrinkage in supply of engineering applicants (chiefly in the mechanical group), as well as a rise in orders for these workers.
East N. Central Region:							
Cincinnati, Ohio	60	72	50	29	26	194	Despite layoffs and cancellation of orders, there is still a slight shortage of engineers in this area. They are being sought for research and development for electronic systems in radar, micro-wave, and allied fields.
Cleveland, Ohio	119	122	217	54	53	42	No significant change.
Columbus, Ohio	42	34	25	24	59	28	Defense contract cancellations resulted in a rise in registrations and decline in unfilled openings.
Indianapolis, Ind.	29	26	23	15	19	27	No significant change.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
East N. Central Region: Cont.							
Chicago, Ill.	187	207	267	103	99	115	Active applications declined because of fewer registrations by mechanical engineers.
Detroit, Mich.	321	203	395	14	6	27	Automobile layoffs were largely responsible for increase in applications of engineers.
Milwaukee, Wisc.	86	81	138	369	375	163	Expansion in durable goods manufacturing sector of economy slowed appreciably in March but cutbacks have not affected the supply or demand for engineers to any appreciable extent.
West N. Central Region:							
Minneapolis-St. Paul, Minn.	126	137	146	174	169	107	Drop in number of civil engineers was main change affecting supply of engineers between January and March. Because of new needs for electrical engineers, unfilled openings rose. The shortage of electrical engineers surpassed that for mechanical engineers during this period.
Kansas City, Mo.	43	27	28	2	5	22	Supply of engineers exceeds demand.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
West N. Central Region: Cont.							
St. Louis, Mo.	66	39	76	131	122	26	Shortage of engineers despite upturn in applications. Available applicants lack experience in specified fields.
South Atlantic Region:							
Baltimore, Md.	70	58	65	118	114	109	Demand up slightly, mostly for civil, industrial, and mechanical engineers.
Washington, D. C.	190	206	157	246	279	108	Area report indicates Federal agencies recruiting graduates to train in their special programs.
Atlanta, Ga.	85	85	62	5	4	4	No significant change.
East S. Central Region:							
Louisville, Ky.	19	11	17	1	1	11	Job applications rising. Supply of engineers adequate to meet foreseeable needs.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
West S. Central Region:							
New Orleans, La.	61	45	73	4	1	21	With layoffs in construction and architectural firms upon completion of some major projects, registrations by civil engineers largely accounted for rise in applications from January to March.
Dallas, Texas	122	91	197	37	43	51	Continued reductions in local aircraft plants further increased the surplus of mechanical and aeronautical engineers. Well qualified electrical engineers remain in short supply.
Houston, Texas	89	97	153	25	17	13	Only significant change in supply was drop in registrations by mining engineers.
Mountain Region:							
Denver, Colo.	129	72	61	335	315	49	Demand for electrical, industrial, mechanical, and aeronautical engineers for aircraft, missiles, and electronics industry groups continued to rise in March. Number of job applicants, especially in industrial and mechanical classifications, also rose but still not adequate to meet local needs.

Trends for Engineers--Selected Area Indicators,
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
Pacific Region:							
Seattle, Wash.	71	88	41	758	1,013	997	Unfilled openings for electrical engineers dropped sharply--by 450 from January to March because of reductions in Bomarc production. However, this decline was counterbalanced to some extent by a rise of 120 openings for mechanical engineers.
Portland, Oreg.	63	47	63	12	11	7	Rise in active applications due to intensified recruiting effort to meet a growing volume of orders for engineers. Large climb in registrations was for civil engineers. Openings for this group also increased, due to seasonal expansion in construction activities.
Los Angeles-Long Beach, Calif.	1,577	1,198	827	369	512	769	Cutbacks, particularly in aircraft but also in electrical machinery and allied industries, caused an increase in supply of engineers and a reduction in number of unfilled openings.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, March 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	
Pacific Region: Cont.							
San Francisco-Oakland, Calif.	263	205	254	48	44	59	Slowdown in highway construction and lack of expansion in durable goods sector of manufacturing resulted in the inability of the area to absorb immigrants and new graduates speedily. Of the engineering categories, civil engineers are in the least enviable position. This group has a higher ratio of applicants to openings than in the depths of the 1957-58 recession. This situation caused by a slash in gas tax revenues as well as a seasonal slack in demand for civil engineering field work. The result is that many lesser qualified civil engineers face employment difficulties. Chemical engineers are rapidly becoming a shortage category. Relative easing of demand for electrical engineers which was reported for the November-January period has all but disappeared. Electrical and electronic engineers are in short supply throughout the area.

NATURAL SCIENTISTS

The job market for natural scientists showed little overall change between January and March in the 30 areas providing detailed information for these occupations. While openings received were off sharply in March from the January level, unfilled needs at the end of the month were up slightly. The supply of natural scientists, as indicated by active applications at public employment offices in the 30 areas, also rose. The rise in applicants was due partly to the entry of recent graduates into the labor market, and, in the San Francisco-Oakland area, to an influx of immigrants, many of whom were laid off in other parts of the State.

The demand-supply balance, as indicated by the ratio of active applications to unfilled job openings, reflects the relatively unchanged situation from January to March. In both periods, the ratio was about 2 to 1. However, the situation is not as bright as it was in March 1959, when the demand-supply ratio was 1 to 1.

Most of the demand for natural scientists was for physicists or mathematicians. Some significant area comments relating to needs in this category follow:

In Seattle, the local demand for mathematicians and physicists exceeds the supply. In other classifications in this category, the demand, while selective is not heavy and the local supply is sufficient. The Seattle area also observes that Boeing has cut its demands in this category over the year, but it is hoping to find unusually gifted personnel for present space projects. In the San Francisco-Oakland area, the sustained shortage of physical scientists was underscored by the comment that "all of the physicists in the files now are new since January." In the Philadelphia area, there was no apparent let up in the demand for scientists while in Denver, with the aircraft and missile industries major employers, the demand continued to grow. However, Dallas reported that the supply of natural scientists continued to exceed the demand.

CHEMISTS

Job prospects for chemists continued to improve during the early spring of 1960. Evidence of the tightening demand-supply situation in this occupation is furnished by data on active applications and unfilled openings at public employment offices. In March, there were some 700 active registrations--only 28 more than in January. This was in sharp contrast to the trend in most of the other selected professional, scientific, and technical occupations which generally showed sizable increases in active file registrations over the same period.

The demand for chemists--as reflected by such public employment office indicators as unfilled openings, openings received, and clearance openings--increased from January to March. Reflecting these changes, the ratio of applicants to unfilled openings fell to 2.3 to 1 in March from 2.6 to 1 in January. In March 1959, there were 5 job applicants for each job opportunity.

Specific indications of increased needs for chemists are revealed in comments from several areas. A tight situation has developed in Philadelphia, according to the local report. In New York City, some decline in job applications is reported, with graduate chemists being sought by drug and cosmetics firms. Newark reports a substantial increase in needs for chemists with some reduction in supply. In San Francisco-Oakland, the area reports that "almost 40 percent of the chemist applicants in the San Francisco commercial office are currently employed, but are looking for better jobs." Much of the demand was in shortage fields such as nucleonics.

DRAFTSMEN

The demand for draftsmen continued largely unchanged from January but the supply increased substantially, largely as a result of layoffs in aircraft and automobile plants and slack in the construction engineering field. The number of draftsmen registered at public employment offices in the 30 metropolitan centers climbed by 1,000, or 26 percent, to a total of about 4,750 in the two-month period, while unfilled openings continued at the January level of about 800.

The surplus of draftsmen was numerically largest in the Los Angeles-Long Beach area where 1,330 registrants were reported at public employment offices. This marked an increase of about 460 from January, largely because of continued cutbacks in aircraft production. The New York City area indicated about 685 applicants, about 80 more than in January. Detroit reported almost 400 job seekers in the draftsmen classification, an increase of 300 due to layoffs at some automobile plants.

Despite the increased supply, the firmness in demand indicated that individual job listings were hard to fill. Specific area comments pinpoint the imbalance between employer requirements and the qualifications of job applicants. In the Boston area, registrants possess architectural and construction experience but needs are reported in the electronics and marine-engineering fields. A surplus of mechanical draftsmen exists in St. Louis, where demands are in the structural and architectural fields. Houston, with 75 applicants, has a critical shortage of process piping draftsmen. Denver reports a surplus of draftsmen with limited work experience or desired skills but indicates shortages for electrical, piping, mechanical (with industrial plant experience), aeronautical and architectural draftsmen.

Opportunities for draftsmen in civil and mechanical trades were limited in the San Francisco-Oakland area because the highway building program had not progressed as anticipated. However, there was a critical shortage of electronics draftsmen.

Some area reports suggested that a better balanced relationship would be reached with the spring upturn in construction.

LABORATORY TECHNICIANS AND ASSISTANTS

Some 2,400 job seekers filed applications in this category in March, almost 300, or 14 percent, more than in January. Many new registrants were students filing for summer jobs and some were recent college graduates. While the supply increased, the demand, as indicated by local office job openings continued relatively firm and close to the January level.

Recruitment difficulties in this field stem, in part, from hiring specifications. Much of the demand is in hospitals and medical research centers where needs are for registered technicians; many job applicants, however, do not meet these qualifications. The shortage in many areas appears to indicate that the qualified technician, if unemployed, encounters little difficulty in finding acceptable employment.

DIGEST

of related information

Industry and Universities Urged to Meet Needs of the 1960's

Industry and universities were urged to redesign their programs for young engineers in order to fulfill the promises of the 1960's. The needs for such a program were discussed by two engineering executives who spoke before the 12th annual College-Industry Conference in St. Louis, Missouri.

W. R. Persons, president of Emerson Electric Company, believes that industry is failing to keep the engineer abreast with trends and developments in American industry today. "We're so busy painting him a rose-colored future," he said, "that we foreget to put the challenges of 1960 and 1970 in front of him." He listed five problems which engineers must help solve:

1. Many products and industries that have looked stable for the past 50 years will become obsolete with industrial research and development. Engineers must understand that they are on the competitive front in product development in order for a company to realize prosperity in the 1960's.

2. Conventional trade outlets are being replaced by a sales revolution which is sweeping most markets. The change has a great impact on cost, styling, and quality. Today's engineers are too often isolated from sales trends and problems.

3. Engineers must help arrange for a common-sense approach to automation, without overemphasis.

4. Mergers may seem unimportant to the engineer, but he should understand and take advantage of the technical strengths they offer.

5. Foreign competition is probably the greatest challenge to engineers. The United States will stay competitive in spite of wage disparity only through the engineer's ability and creativeness.

Speaking to educational institutions, E. F. Branahl, manager of Aeromechanics for the Missile Engineering Division of McDonnell Aircraft Corporation, expressed the conviction that undergraduate courses should more strongly emphasize fundamentals. Many of the practical courses an engineer takes in college are outmoded by the time he has worked in industry for 10 or 15 years. However, the basic courses are still fully applicable, because his prior training puts him in a position to absorb any advances which have been made in these fundamentals.

Mr. Branahl challenged the universities to keep their curricula in the graduate school updated at all times, to continue performing basic research, and to improve basic teaching skills. He finally proposed that universities make it easier for the young engineer to take graduate courses by offering such courses at a time that will not conflict with his job.

Product Engineering
February 15, 1960

Preparing Engineer-Scientist For Frontier Fields

A new breed of engineer-scientist will emerge from schools of engineering in the next five years in view of sweeping changes in the philosophy and content of scientific education in the U. S. The engineers of the future will receive intensive training in physics, field theory, structural chemistry, and other disciplines.

MIT revolutionized its engineering education with a pilot program in 1956. The project is being expanded and the pace speeded by a $9,275,000 grant from the Ford Foundation. Core curricula for training of the engineer-scientist will cut across traditional departments and prepare the student for tomorrow's frontier fields, such as materials, propulsion, energy processing, information processing, etc.

Electronics
November 20, 1959

Demand for Graduates With Computer Training

Industry is in need of college graduates trained in the use of computers, according to a survey of 325 companies made by Frank R. Hartman of Pennsylvania State University

Computer facilities are available in 70% of the companies surveyed and a preference was shown for graduates trained in their use. College curricula mentioned most frequently which should include computer training were: mathematics, accounting, electrical engineering, business administration, mechanical engineering, chemical engineering, and physics.

While 447 persons were hired for jobs requiring knowledge of computers during 1958 by the reporting companies, there are still 1,031 jobs unfilled or filled with inadequately trained personnel. By 1970, these companies anticipate having about 4,000 jobs requiring knowledge of programming, understanding of computer capabilities, and ability to interpret results.

Engineering and Employment
Practices Newsletter
March 1960

Changes in Demand and Special Recruitment Problems

The need for research and development engineers remains high as companies intensify their stress on new products, but job opportunities for civil engineers are being curbed by a slowdown in plant expansion.

A survey of 1,400 petroleum producers by Chicago's Cadillac Associates indicates that demand for geologists by surplus-ridden oil firms slumped by 85% from a year ago. First quarter requirements for defense industry engineering executives declined by 64% in that time, according to Heidrick and Struggles, executive recruiters.

The Pacific Mutual Life Insurance Company is plagued in its search for actuarial trainees by the continuing need for mathematicians by industry and Government.

Wall Street Journal
May 12, 1960

Finding Tomorrow's Engineers

An industry-school program is under way in Long Island, N. Y., designed to discover science and engineering talent early and channel it into these fields. The Summer Work Experience Program is a joint endeavor of local high schools and an industrial laboratory. Each summer 20 high school students with engineering potential work as technical aids. The basic objective is to place students in close association with experienced science and engineering personnel in the framework of daily, on-the-job work experience. After eight weeks, the student has a pretty good idea whether or not engineering is for him, and whether he is cut out for engineering.

Electronics
November 20, 1959

Overseas Science Scouts

Spectacular advances in European research have encouraged practically every American company of any consequence to have technical representatives in Europe. These industrial specialists--overseas scientific representatives--keep their companies abreast of the latest technical developments which could help increase product volume, upgrade product quality, or reduce unit costs.

Stateside interest has been spurred by the dramatic European developments in chemistry, metallurgy, electronics, mechanical engineering, physics, and other areas. European scientists have developed such improved materials as an ultra-high purity silicon for better transistors, water-solvent plastics, and resins that resist high temperatures.

Research in Europe is directed more toward fundamental problems and is often limited to a certain area. As a result, it is deeper and more creative. Research in America is done on a grand scale. While it is very successful, it is not selective enough and very expensive. Combining the more leisurely fundamental discoveries of scientists in Europe with the hard-driving American applied-research techniques make technical prospecting in Europe very profitable.

Scientific agents operate by developing and cultivating contacts with people who are important in specific fields, and they must be able to detect possible relationships between widely divergent accomplishments. Sometimes benefit is even gained from ideas that do not materialize as originally expected.

New York Times
May 12, 1960

Orienting Teen-Agers in Science

About 6,700 high school students with the highest academic qualifications will participate this summer in 137 science training programs approved by the National Science Foundation. The teen-agers chosen to attend will engage in research or pursue courses especially designed to help them plan careers in science, mathematics, and engineering. The projects will be carried out in 129 colleges, universities, and research organizations throughout the country.

Chemical and Engineering News
February 1, 1960

Less Demand for Executive Talent Expected in Next Six Months

Fewer high-paid executives will be required by big business firms in the coming months of 1960 than during the latter half of 1959. A recent survey of some 145 firms by the Executive Manpower Corporation of New York City reflected a demand for nearly 2.5 top men per company in the next six months. 3.2 openings per company were indicated in a comparable survey of last June.

The participating companies reported 365 jobs available. Most of the vacancies were for sales executives, followed by engineering management, and manufacturing-production specialists. Engineering executives are expected to be the most difficult to recruit, followed in order by sales and manufacturing-production executives.

While 84% of the jobs would pay from $10,000 to $20,000 annually, 13% would pay between $20,000 and $40,000., The salary structure of the remaining 3% of the positions would be between $40,000 and $75,000.

Promotion from within the company is the favorite method of finding executive manpower. In second place is management recruiting, followed in sequence by advertising and use of employment agencies.

Engineering Employment
Practices Newsletter
May 1960

Money, Fringe Benefits Cause Teacher to Leave Campus

While money is not the only reason for engineering teachers leaving the campus for industry, it is usually the deciding factor, according to a survey by A. R. Helwarth, assistant dean of the University of Michigan College of Engineering.

Nearly one-half of the 235 former teachers from 77 colleges surveyed reported that income and fringe benefits were the primary motives for changing jobs. Other reasons which prompted the shift included dissatisfaction with teaching loads, administrative detail, and relations with college and administration.

The 235 former teachers averaged $9,800 during their first year in industry. They averaged $5,800 in teaching, or $7,650 including extra income for additional duties such as summer jobs and consulting.

"Salary and money factors" and "work or working conditions" were named most often as the advantages of industrial employment. While 211 of the 235 are happy in their new jobs, 195 expressed a desire to return to teaching, either after acquiring more industry experience, or when financially able.

Engineering Employment
Practices Newsletter
March 1960

R & D Dollar Outlays Can Be Misleading

The country's mounting research and development expenditures, when measured in terms of dollar outlays, fail to reveal how adequate our efforts may be in relation to earlier periods--warns David Novick, head of RAND Corporation's Cost Analysis Department. In the California Management Review, Novick contends that dollar outlays tend to obscure the effects of inflation, reclassification of traditional outlays, and confusion about the object of research.

Research expenditures increased by 60-fold in terms of dollar amounts between 1930 and 1960. However, the impact of swollen prices on our economic growth reduces the rise in real expenditures to 30-fold.

Novick indicates that the traditional research base has been broadened to include activities such as marketing, advertising, packaging, routing, etc. While he concedes that these functions are within the realm of research and development, they are "not the kind that is the implied magic of R & D."

According to Novick, the object of research--the search for new knowledge--is confused with the application or improved application of new knowledge. He doubts whether enough money is being channeled into the type of research which is geared to the long-range future.

A fair appraisal of our research effort hinges on the development of more satisfactory identification and accounting practices than those now available, concludes Novick.

Washington Post
May 18, 1960

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is the Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas [1] for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

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[1] The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 30.

List of 30 Major Labor Market Areas by Regions

New England:

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Newark, New Jersey
Paterson, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Indianapolis, Indiana
Chicago, Illinois
Detroit, Michigan
Milwaukee, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
Kansas City, Missouri
St. Louis, Missouri

South Atlantic:

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Dallas, Texas
Houston, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-May 1960

Month and Year	All Occupations	Professional & Managerial	Selected Occupations 1/				
			Total	Engineers	Scientific	Draftsmen	Technicians
Jan. 1956	27,887	12,845	6,803	4,792	435	1,361	215
Jan. 1957	35,629	14,498	8,993	6,349	389	1,988	267
March	34,390	15,952	9,300	6,428	732	1,851	289
May	31,452	14,007	8,404	5,976	576	1,591	261
July	29,144	11,879	7,407	5,437	590	1,174	206
Sept.	23,208	8,986	5,480	3,946	569	791	174
Nov.	13,859	5,388	2,879	1,993	294	384	208
Jan. 1958	14,665	7,726	2,582	1,817	245	315	205
March	14,451	8,244	3,496	2,717	398	204	177
May	15,552	9,439	3,505	2,764	330	244	167
July	14,420	7,514	3,540	2,921	233	212	174
Sept.	15,363	8,732	5,303	4,447	431	255	170
Nov.	17,661	9,308	4,789	3,906	475	243	165
Jan. 1959	16,042	10,530	5,426	4,386	489	377	174
March	17,960	10,820	5,473	4,278	576	391	228
May	23,232	12,828	5,635	4,387	602	402	244
July	20,559	10,112	5,315	4,128	486	495	206
Sept.	21,414	10,140	6,320	5,096	500	548	176
Nov.	21,101	11,740	6,585	5,193	600	616	176
Jan. 1960	19,735	11,834	5,817	4,389	648	605	175
March	21,286	12,611	5,167	3,927	587	442	211
May	19,839	11,217	4,710	3,589	550	364	207

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Table II. Clearance Openings in Selected Occupations 1/ March and January 1960, March 1959

Occupation	March 1960	Jan. 1960	March 1959	Percent Change to March 1960 from: Jan. 1960	Percent Change to March 1960 from: March 1959	Percentage Distribution March 1960
All selected occupations	5,167	5,817	5,473	-11.2	-5.6	100.0
Professional						
Engineers, total	3,927	4,389	4,278	-10.5	-8.2	76.0
Metallurgical	45	43	40	a/	a/	.9
Chemical	144	98	103	+46.9	+39.8	2.8
Civil	238	218	397	+9.2	-40.1	4.6
Electrical	1,986	2,532	1,891	-21.6	+5.0	38.4
Industrial	242	225	211	+7.6	+14.7	4.7
Mechanical (exc. aero.)	969	1,055	918	-8.2	+5.6	18.8
Aeronautical	303	216	715	+40.3	-56.8	5.9
Mining	0	2	3	a/	a/	b/
Other professional	587	648	576	-9.4	+1.9	11.4
Natural scientists	404	468	461	-13.7	-12.4	7.8
Physicists	210	234	184	-10.3	+14.1	4.1
Mathematicians	140	159	170	-12.0	-17.7	2.7
Statisticians	2	2	2	a/	a/	b/
Life scientists	47	51	83	-7.9	-43.4	.9
Earth scientists	5	22	22	a/	a/	.1
Chemists	183	180	115	+1.7	+59.1	3.5
Semiprofessional						
Draftsmen, total	442	605	391	-27.0	+13.0	8.6
Mechanical	140	266	180	-47.4	-22.2	2.7
Other	302	339	211	-10.9	+43.1	5.8
Laboratory technicians and assistants, total	211	175	228	+20.6	-7.5	4.1
Medical technicians	165	136	191	+21.3	-13.6	3.2

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a/ Percent change not shown where both absolutes are less than 50.
b/ Less than 0.05 percent.

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis.

Table III. Number of Active Applicants Registered by Public Employment Offices
in 30 Major Labor Market Areas, for Selected Occupations
March and January 1960, and March 1959

Labor Market Area	Chemists			Natural Scientists			Draftsmen			Laboratory Technicians		
	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959	March 1960	Jan. 1960	March 1959
Total..............	706	678	786	761	713	615	4,767	3,780	5,903	2,407	2,114	2,780
Boston..............	25	23	43	23	23	13	279	213	172	91	66	91
Providence...........	6	4	12	2	1	3	27	23	43	29	22	30
Buffalo..............	14	8	28	18	7	12	44	27	97	66	66	85
New York.............	184	221	194	171	224	130	685	609	1,141	367	241	359
Newark...............	33	39	66	17	24	21	64	48	185	73	105	165
Paterson.............	11	11	19	8	7	4	77	61	74	56	41	44
Philadelphia.........	25	37	32	17	21	31	275	314	515	141	158	223
Pittsburgh...........	15	14	47	15	14	24	184	199	587	126	145	322
Cincinnati...........	3	9	6	5	3	2	36	66	38	39	61	21
Cleveland............	14	14	12	2	3	9	66	75	282	53	58	67
Columbus.............	4	4	5	4	4	3	22	21	18	19	9	17
Indianapolis.........	5	4	4	6	0	1	24	19	17	31	22	29
Chicago..............	31	32	55	16	10	23	91	115	214	95	94	113
Detroit..............	13	11	24	13	4	6	392	89	631	77	44	160
Milwaukee............	20	19	18	23	17	21	11	13	53	10	12	31
Minneapolis-St. Paul..	10	11	15	17	19	15	71	88	132	38	29	42
Kansas City..........	11	8	8	4	0	6	37	33	32	26	18	35
St. Louis............	13	2	9	13	9	12	68	36	79	75	58	59
Baltimore............	9	11	9	0	2	6	103	58	69	30	24	39
Washington...........	27	27	20	42	46	51	166	110	82	67	54	66
Atlanta..............	5	6	4	10	7	4	76	99	43	41	31	27
Louisville...........	8	6	3	2	2	2	24	22	16	20	18	23
New Orleans..........	10	3	16	45	30	18	53	41	61	32	21	38
Dallas...............	9	4	8	33	21	28	65	75	106	35	24	37
Houston..............	13	13	16	36	34	29	73	80	123	48	63	54
Denver...............	9	9	9	35	51	30	67	38	21	27	71	37
Seattle..............	15	11	2	13	5	11	51	63	34	26	31	12
Portland.............	8	8	8	5	7	7	53	44	23	44	38	38
Los Angeles-Long Beach	113	78	61	112	85	72	1,331	870	751	435	374	344
San Francisco-Oakland.	43	31	33	54	33	21	252	231	264	190	116	172

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CURRENT LABOR MARKET CONDITIONS in ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

JULY 1960

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary

BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director

Washington 25, D. C.

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Office of Program Review and Analysis

Louis Levine, Deputy Director, Bureau of Employment Security

This bimonthly report is prepared by the Office of Program Review and Analysis, Bureau of Employment Security, U. S. Department of Labor. It is based on field reports on current conditions in 30 major labor market areas, statistics on job openings for selected engineering, scientific and technical occupations placed in interarea clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources. This study was prepared by Benjamin Goldstein, with the assistance of Donald E. Beatty.

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Trend Indicators

OUTLOOK FOR ENGINEERS AND SCIENTISTS IN MAJOR LABOR MARKET AREAS: Labor demands for engineers and other scientific personnel continued to slacken despite further expansion of research and development activities in some areas. The eased labor market conditions are not expected to alter appreciably in the next few months. From New Orleans: "There are no indications that local demands will be significant in the near future." . . . From Denver: "The outlook for the next two months for these selected occupations should remain about the same as the period March through May." . . . From Milwaukee: "Employment in durable goods manufacturing is not expected to change much during the next four months. Since firms in this section of the economy employ the bulk of the 'selected occupation' group, it appears that the current supply-demand situation will hold." . . . In contrast, Philadelphia anticipates a strong need for electronics engineers because "smaller research firms are growing all over the area and most are engaged in electronics work. These and other firms with research facilities are constantly on the lookout for engineers and scientists with at least a bachelor degree." . . . And in the San Francisco-Oakland area, the forecast is for "an aggravation of shortages in certain categories while only minor improvements will occur in those occupations where unemployed workers are relatively numerous." The labor market for chemical engineers will become tighter because of expansion in the chemical industry; shortages of civil engineers with specialties in sewage treatment will intensify; experienced personnel for research will remain in short supply; however, demand for technical personnel for the electronics industry may ease.

EMPLOYER PRACTICES IN MEETING MANPOWER PROBLEMS: A scarcity of piping draftsmen in the Houston area was resolved as employers who could spare them for the necessary length of time permitted their utilization in other firms. . . . An electronics manufacturing firm expanding its electronics data processing division is featuring merit salary reviews for all personnel every three months as a recruiting device. . . Employers are considering qualified women workers for jobs traditionally held by men. Firms in the Boston area which have always used male technical writers are reportedly willing to interview qualified women.

1960 GENERALLY A GOOD YEAR FOR ENGINEERING AND SCIENCE COLLEGE GRADUATES: Roundup of reports on recruiting this year's graduates. Providence: Only a few recently graduated engineers from local colleges were job applicants as most of these graduates had been recruited by national concerns long before they had finished their schooling. . . . Philadelphia: The 1960 class of graduates in these occupations has apparently been fully employed; they are not appearing on the open market as job applicants. . . . Pittsburgh: The universities state that there has been no slackening in college recruitment efforts by employers. At both Pitt and Carnegie Tech, the graduate engineer with no experience can expect to start for $515 to $525 a month; some with on-the-job training may start as high as $650. . . . Cleveland: Graduates of two Cleveland engineering colleges were offered jobs paying an average of $525 per month. Chemistry majors at another college were offered up to $500 a month, and those with Ph.D. degrees up to $850. Women chemistry graduates had no trouble whatever getting jobs. . . . Milwaukee: The area market for college graduates is about the same as that of a year ago. Employers, however, appear to be more selective this year. Courses of study, scholastic rank and personal traits are being given closer scrutiny--particularly in the recruitment of Letters and Science graduates. The demand for technically trained workers in the engineering, health, social service and natural science fields is strong. . . . Baltimore: The greatest demand continues to be for recent engineering graduates with little or no work experience. . . . Houston: College recruitment of engineers has definitely been stepped up. . . . Seattle: Recruitment activity by Boeing during the past several months has been concentrated in colleges and universities throughout the country.

NONPERFORMANCE HIRING SPECIFICATIONS--age, sex, physical condition--present formidable obstacles in placing otherwise acceptable applicants; however, these requirements are sometimes waived. Newark reports that age and physical condition specifications are capable of being relaxed. . . . In Cleveland, "while not widespread, there has been some relaxing of age and educational requirements in a few cases." . . . However, Columbus observes that openings are difficult to fill because of age requirements; many applicants are over 50 and employers are asking for workers under 45. . . . In Chicago, hiring specifications relating to age, sex, and physical condition, are still very rigid. Most orders call for young persons, while the majority of applicants are in the upper age brackets.

SHORTAGES OF HIGH-LEVEL SPECIALIZED TALENT STILL ACUTE: Despite an employment slowdown in several major centers which has affected most occupations, including engineers and supporting technicians, several areas report a continued stringency of top-level talent. . . . Boston: The urgency and volume of requirements for engineers and scientists at the bachelor's degree level dropped but demands for two- and three-degree individuals do not appear to have moderated to any appreciable extent. The long-standing shortage in the supply of top-level, well-qualified scientific personnel will continue to exist. . . . Cincinnati: Only a few companies are hiring and then only highly experienced personnel in technical fields. . . . Washington, D. C.: Vacancy lists and specific job requests from industry and the Federal government in the science and engineering fields indicate heavy demands for personnel with highly specialized experience and graduate training in specific fields. . . . Los Angeles-Long Beach: Despite the loosening job market, several major companies are still recruiting for professional and technical personnel, but in senior classifications with emphasis on advanced degrees and rather specific experience prerequisites. . . . San Francisco-Oakland: Almost without exception, the unfilled orders currently held specify more extensive experience than they have during recent months. Most orders require at least three to five years of specific experience, and some as much as 15 years of experience.

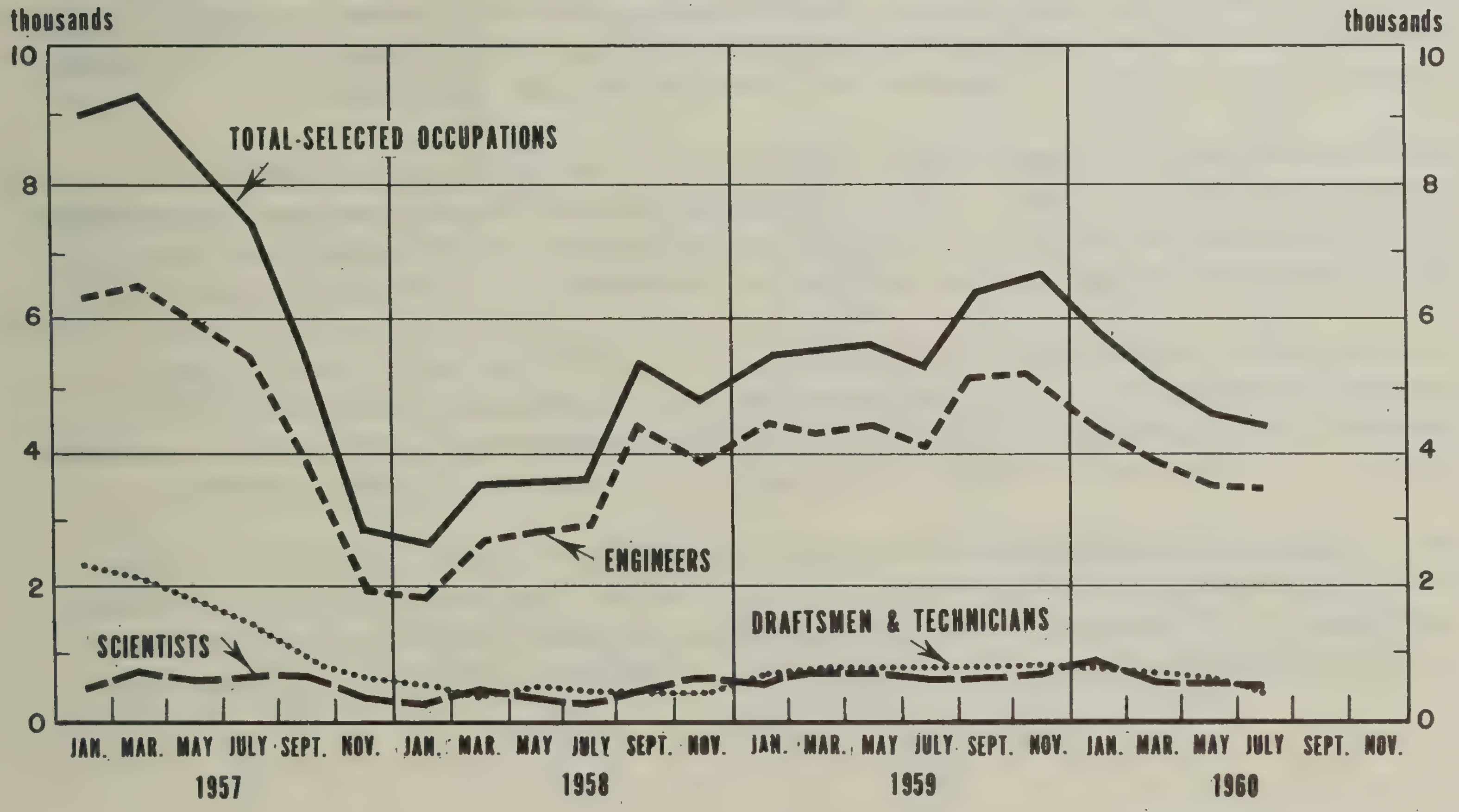
recent developments in

INTERAREA RECRUITMENT

Clearance openings in selected engineering, scientific, and technical occupations declined again in July but the downtrend in these job categories, which has continued uninterruptedly since November 1959, was not as marked as in other recent bimonthly periods. The reduction in listed job vacancies--for which qualified local applicants are not available and where recruitment has been extended to other areas--approximated 300 or 7 percent between May and July as compared with 9 percent between March and May and 11 to 12 percent in the two preceding periods. All of the principal occupational groups experienced losses between May and July. Aggregate job openings in interarea clearance now total about 4,400, some 900 or 17.2 percent below the year-ago level.

TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES

BIMONTHLY, 1957-1960



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

The drop in engineering vacancies in July was almost entirely confined to the mechanical group (See Table, page 5). The aircraft industry in Washington, in response to its changing employment requirements, sharply reduced its needs in this specialty. Also, the aircraft propeller industry in Connecticut and establishments engaged in missile work in Colorado withdrew or reduced their orders for these workers. As a result, despite a substantial order for mechanical engineers for research work in the design, construction, and testing of mechanical equipment at a government installation in Alabama, the volume of clearance openings in this category declined. In all, there were about 200 fewer job openings for mechanical engineers in July than in May.

In the important electrical engineering group, accounting for more than half of total openings for engineers, counterbalancing developments in various States limited the May to July increase in clearance openings to about 50. In at least three States, gains in openings were relatively sizeable. In Washington, Boeing sharply raised its needs in this classification, while in Alabama, a government installation began intensive recruitment for these hard-to-fill jobs. Also, an important communication equipment supplier in North Carolina working on several major missile contracts was reportedly recruiting large numbers of these engineers for the installation, testing, operation, and maintenance of various types of electronic devices and systems. In other States, such as Ohio and California, modest increases in job listings for electronics engineers were also reported. The communication equipment industry in Wisconsin and Maryland, on the other hand, withdrew or reduced their listings for these engineers. Significant reductions were also made by several industries in Connecticut, New Jersey and New York.

Some increased needs were also reported in the civil and chemical engineering specialties. Gains in these groups helped reduce the overall bimonthly decline in job openings for engineers to 100 and held the July clearance total in the entire engineering category at about 3,500.

Opportunities for natural scientists were fewer in July than in May, largely because of a drop in vacancies for physicists and chemists. However, job openings for mathematicians rose during this period, largely because of increased needs in the aircraft industry in Washington.

Vacancies for draftsmen declined appreciably over the bimonthly period from 364 in May to 272 in July, partly due to decreased needs for detail draftsmen in Wisconsin's communication equipment industry. Clearance openings for laboratory technicians also declined between May and July.

Number of Nonagricultural Job Openings in Selected Occupations in Interarea Clearance at Public Employment Offices, U. S. Total, July and May 1960, and July 1959

Selected Occupations	Job Openings			Change to July 1960 from:			
				May 1960		July 1959	
	July 1960	May 1960	July 1959	Number	Percent	Number	Percent
All Selected Occupations	4,401	4,710	5,315	-309	-6.6	-914	-17.2
Engineers, total	3,489	3,589	4,128	-100	-2.8	-639	-15.5
Chemical	167	141	89	+26	+18.4	+78	+87.6
Civil	276	237	357	+39	+16.5	-81	-22.7
Electrical	1,850	1,805	1,947	+45	+2.5	-97	-5.0
Industrial	227	228	150	-1	-0.1	+77	+51.3
Mechanical	675	861	810	-186	-21.6	-135	-16.7
Aeronautical	259	271	721	-12	-4.4	-462	-61.1
Natural Science Occupations	483	550	486	-67	-12.2	-3	-.6
Chemists	140	171	118	-31	-18.1	+22	+18.6
Physicists	162	208	156	-46	-22.1	+6	+3.8
Mathematicians	129	112	160	+17	+15.2	-31	-19.4
Other	52	59	52	-7	-11.9	n.c.	n.c.
Draftsmen	272	364	495	-92	-25.3	-223	-45.1
Laboratory technicians	157	207	206	-50	-24.2	-49	-23.8

n.c. -- no change.

CURRENT TRENDS IN LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

The labor market situation for engineering, scientific, and technical personnel continued to ease at mid-year. Unfilled job openings in these selected occupations in 30 major areas declined about 8 percent between March and May, despite sustained recruiting for expansion in some research and development projects and demands for top-level talent. Aircraft, steel, auto and machinery cutbacks as well as weaknesses in other durable goods manufacturing sectors contributed to reduced area labor needs. Entry into the labor force of 1960 college graduates also helped ease the labor demand-supply situation. Active employer recruiting at colleges was evident in all sections of the country, and some previously unfilled openings were cancelled when establishments found graduates capable of meeting their job requirements.

Registrants at public employment offices in the selected occupations in the 30 major areas totalled 15,700 in May 1960, an increase of 1,600 or 11 percent from March. Draftsmen accounted for a major portion--about 60 percent--of the increased supply of applicants while engineers comprised about one-third of the added supply. Laboratory technicians were the only occupational group apparently experiencing a slightly more favorable job market in May than in March. The number of applicants in this category declined somewhat while unfilled openings increased.

While the principal reduction in unfilled job openings between March and May was reported in the engineering group, this category nevertheless continued to account for almost two-thirds of total needs in the selected occupations and over three-fourths of the hard-to-fill jobs placed in interarea clearance. The most appreciable demands in this category continued to be for electrical engineers.

In the drafting field, designers, personnel with an architectural background as well as individuals with experience in refining operations, sewage treatment, and electronics were being sought. Among natural scientists significant needs were evident for chemists, physicists, and mathematicians. There was also no modification of the chronic shortage of registered medical technicians.

ENGINEERS

Increased availability of engineers and further reductions in demand were reported between March and May. Although research and development personnel and other well-qualified experienced engineers were being actively recruited, the number of job applicants seeking engineering work through public employment offices in the 30 major labor market areas increased by some 500 to a total of nearly 6,000. During the same period, unfilled job openings decreased by almost 300 to about 3,000. The continued weakening in the job market for engineers has appreciably altered the long-term demand-supply ratio for engineers in the 30 major areas. In May 1960, there were two job seekers for each unfilled opening as compared with a 1.7 to 1 ratio in March and a 1 to 1 ratio in the period between July and November 1959.

Weaknesses in several durable goods manufacturing sectors contributed appreciably to the downtrend in employment opportunities for engineers. A number of reporting areas experienced cutbacks in aircraft, steel, and autos, as well as in farm, construction and other machinery. Cancellation and phasing out of defense contracts in some electronics plants and cutbacks at a missile plant were also reported. Compensating gains were limited, with a seasonal pick up in some local, private and public construction programs absorbing a number of civil engineers and other demands noted for research, design, and development personnel.

Another significant factor modifying the supply-demand relationship was the availability of new college graduates for work in the engineering field. In the Boston area, a drop in the urgency and volume of demand for engineers reportedly was "attributable to the forthcoming addition to the labor force of 1960 college graduates." The Minneapolis-St. Paul labor market area, which reported a decline in unfilled openings for electrical engineers, indicated that these vacancies were being filled by June graduates. Some recent graduates filing job applications were apparently canvassing the field despite having secured offers of employment while still in college.

The largest increases in the number of engineers seeking jobs at public employment offices occurred in the Detroit and St. Louis areas. Detroit had 137 more applications in May than in March, principally in the mechanical and industrial classifications, as a result of defense and other layoffs at plants of a major auto producer. The St. Louis area attributed a rise of 83 job seekers, mostly mechanical and aeronautical engineers, to substantial reductions in the engineering department at McDonnell Aircraft.

Aside from New York City and Seattle, area declines in the number of engineering job seekers, were nominal. In New York, increased needs were noted in the principal categories of engineers; in Seattle, engineers were reportedly either returning to work or finding new jobs in industries other than the aircraft industry.

Number of Engineering Job Applicants
May and March 1960, and May 1959

Engineering Specialty	Active Applications			Change to May 1960 from:			
				March 1960		May 1959	
	May 1960	March 1960	May 1959	Number	Percent	Number	Percent
Engineers, total	5,985	5,466	4,905	+519	+9.5	+1,080	+22.0
Metallurgical	87	96	128	-9	-9.4	-41	-32.0
Chemical	295	282	348	+13	+4.6	-53	-15.2
Civil	924	997	962	-73	-7.3	-38	-4.0
Electrical	954	786	734	+168	+21.4	+220	+30.0
Industrial	1,087	872	867	+215	+24.7	+220	+25.4
Mechanical	2,299	2,108	1,731	+191	+9.1	+568	+32.8
Aeronautical	276	269	73	+7	+2.6	+203	+278.1
Mining	63	56	62	+7	+12.5	+1	+1.6

The March to May rise in job registrations extended to all engineering classifications, except civil and metallurgical. While the change in the latter group was small, the reduced number of civil engineering applicants reflected a seasonal pickup in both private and public construction programs. Local-demand supply imbalances were also being reported for civil engineers. The San Francisco-Oakland report, for example, indicated that the area offered the civil engineer experienced in design unlimited opportunity because local demand had been augmented by foreign construction contracts. However, the bulk of the job applicants have experience in field work, sales, and administration. As a result, the number of civil engineers in the area diminished only slightly from March to May while unfilled openings in this category almost doubled.

The largest numerical increase in job applications occurred in the industrial engineering category; this group was particularly hard hit by layoffs in the Detroit and Los Angeles-Long Beach areas. Sizeable increases in registrations were also reported for mechanical and electrical engineers. The rise in applications in the chemical, aeronautical, and mining engineering groups was limited.

On the demand side, increased needs for civil and industrial engineers between March and May were more than offset by sizeable declines, notably in the mechanical and electrical specialties. Most of the reduction in unfilled openings for mechanical engineers occurred in Seattle because of curtailed employment needs at Boeing. The drop in demand for electrical engineers was centered largely in the Washington, D. C., Newark, and Los Angeles-Long Beach areas.

Despite the reduced requirements for electrical engineers, the most significant needs continued to be reported in this category. In the Newark area, electrical engineers were in demand for research, design, and development of missile guidance, and transmission and receiving devices. The San Francisco-Oakland area reported that needs for these workers for power and lighting had increased to meet not only local demands but also the requirements of engineering firms designing facilities to be constructed outside the area. Significant supply inadequacies were also reported in a number of other localities.

With many employers currently requiring more extensive education and experience than they have for some time, particularly for research, design, and development work, appreciable numbers of job applicants without college degrees were experiencing placement difficulties. In May, between five and six out of ten engineering applicants had a college degree. The proportion varied from close to 40 percent of the job seekers in industrial engineering to over 85 percent of those in chemical engineering. Data for the several specialties follow:

Engineering Applicants with College Degrees
Registered at Public Employment Offices
in May 1960

Engineering Specialty	Percent with Degree
All applicants	55
Metallurgical	75
Chemical	86
Civil	64
Electrical	58
Industrial	38
Mechanical	52
Aeronautical	51
Mining	79

Area Trends

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications May 1960	Active Applications March 1960	Active Applications May 1959	Unfilled Openings at end of: May 1960	Unfilled Openings at end of: March 1960	Unfilled Openings at end of: May 1959	Comments
Summary, 30 Areas	5,985	5,466	4,905	3,029	3,303	3,742	With few exceptions, most of the reporting major employment centers indicated an easing job market for engineers as the first half of 1960 drew to a close. Cutbacks in steel, autos, aircraft, farm and construction machinery, and other durable goods curtailments contributed to a reduced demand and increased supply of engineers. Another contributing factor was the entry into the labor force of 1960 graduates. However, there was little moderation in the long-standing stringency in the supply of top-level, well-qualified engineering and scientific talent.
New England Region:							
Boston, Mass.	252	201	235	75	77	123	A significant development during the March to May period was the drop in the urgency and volume of demand for engineers at the bachelor's degree level. This is attributable to the addition to the labor force of 1960 college graduates. Demands for two- and three-degree individuals, however, do not appear to have moderated to any appreciable extent. The rise in work applications reflects the registration of June college graduates.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications May 1960	Active Applications March 1960	Active Applications May 1959	Unfilled Openings at end of: May 1960	Unfilled Openings at end of: March 1960	Unfilled Openings at end of: May 1959	Comments
New England Regions: Cont.							
Providence, R. I.	57	40	61	3	6	11	Most noteworthy changes in supply situation occurred in the industrial and mechanical engineering groups due to separations in machine tool and other plants.
Middle Atlantic Region:							
Buffalo, N. Y.	129	82	228	48	79	95	Labor demand-supply relationship for engineers eased between March and May. Job orders received and unfilled openings declined while active applications increased. In March, three of the specified engineering fields were in short supply but by May none was reported in this category.
New York, N. Y.	607	643	778	131	103	70	Overall, the demand-supply situation for engineers tightened. However, conditions varied in specific classifications. Structural engineers were released recently because of some slack in firms engaged in power plant and other heavy industrial work. Also, supply of mechanical engineers rose when several major firms completed work on defense contracts. Meanwhile, local government agencies experienced difficulty in filling vacancies for civil, electrical, and mechanical engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	
Middle Atlantic Region: Cont.							
Newark, N. J.	168	97	175	51	76	44	Sharp increases in registrations in May, chiefly among mechanical and industrial engineers, virtually cancelled the drop which took place between January and March. However, the current total of applicants is slightly less than the number reported a year ago. Significant drop noted in unfilled openings for electrical engineers.
Paterson, N. J.	83	97	108	25	14	83	Demand for engineers in May centered in electrical, mechanical, and industrial fields. Number of unfilled openings for electrical engineers, however, is substantially below year-age level.
Philadelphia, Pa.	311	329	449	25	24	161	Little change in demand from two months ago with somewhat fewer applicants. Despite growth of small research firms which are on the lookout for engineers, overall demand is well below that of a year earlier.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications May 1960	Active Applications March 1960	Active Applications May 1959	Unfilled Openings at end of: May 1960	Unfilled Openings at end of: March 1960	Unfilled Openings at end of: May 1959	Comments
Middle Atlantic Region: Cont.							
Pittsburgh, Pa.	164	159	269	39	51	42	No substantial overall change in applications, with some diversity in specific fields. Registrations of electrical and mechanical engineers rose while those for aeronautical engineers declined. Demand for civil engineers picked up seasonally. However, orders for mechanical engineers declined, reflecting the reduced manufacturing level in the steel producing and fabricating industries.
East N. Central Region:							
Cincinnati, Ohio	55	60	40	23	29	214	Some lull reported in hiring. Job openings for engineers in May down sharply from year-ago level.
Cleveland, Ohio	129	119	140	42	54	53	Easing job market reflected in increase in number of job applications and decline in unfilled openings. Lay-offs in several engineering firms and textile plant contributed to rise in supply. Drop in unfilled openings caused by cancellation of orders for mechanical engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	
East N. Central Region: Cont.							
Columbus, Ohio	47	42	23	18	24	16	Applications by engineers only slightly higher than the number in March but double year-ago total. Long-term increase in supply partly attributable to cutbacks at North American Aviation.
Indianapolis, Ind.	41	29	14	25	15	21	Increased supply due to applications from college graduates.
Chicago, Ill.	191	187	212	99	103	155	Total supply virtually unchanged; however, specific classifications show divergent movements. Declining number of chemical and civil engineering registrants counterbalanced by increases in applications from electrical and industrial engineers. Little change in applications from metallurgical, mechanical, aeronautical, and mining engineers.
Detroit, Mich.	458	321	291	7	14	30	Sharp increase in number of engineering applicants, chiefly in mechanical and industrial classifications, largely result of layoffs at plants of major automobile producer.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	
East N. Central Region: Cont.							
Milwaukee, Wis.	94	86	110	349	369	341	Limited drop in demand for engineers attributable to cancellation of openings by firms in farm and construction machinery industry. Significant needs for engineers and scientists for work on missile guidance systems.
West N. Central Region:							
Minneapolis-St. Paul, Minn.	201	126	104	147	174	102	Decline in unfilled openings, rise in applications attributable to June graduates. Principal increase in engineering job applications reported in industrial and mechanical categories. Unfilled openings decline centered in electrical category.
Kansas City, Mo.	42	43	19	0	2	22	No significant change.
St. Louis, Mo.	149	66	61	137	131	67	Substantial reductions in engineering department of aircraft plant account for increase in supply of mechanical and aeronautical engineers. Electrical engineers in demand, with increasing needs also reported for chemical engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	
South Atlantic Region:							
Baltimore, Md.	59	70	59	109	118	108	Unfilled openings and applications down somewhat in past 60 days. Greatest demand continues to be for electronics engineers.
Washington, D. C.	231	190	111	173	246	82	Although the number of job seekers has increased, much of labor demand is for personnel with highly specialized experience and graduate training in specific fields. Applicants experiencing difficulty in meeting the qualification requirements of listed openings.
Atlanta, Ga.	93	85	45	7	5	4	Overall supply up somewhat; applications from industrial, mechanical, and aeronautical engineers rose while those from civil engineers dropped. No classification reported in short supply.
East S. Central Region:							
Louisville, Ky.	13	19	25	3	1	7	Job applications decline; supply adequate to meet listed needs.
West S. Central Region:							
New Orleans, La.	47	61	44	3	4	18	Decline in active applications due largely to drop in registrations by civil and electrical engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	
West S. Central Region: Cont.							
Dallas, Texas	154	122	80	20	37	60	Reductions in force in aircraft further increased surplus of mechanical engineers. Demand-supply situation for electrical engineers changed from short supply to balanced supply as a result of cancellation of openings at aircraft plant.
Houston, Texas	109	89	95	20	25	8	Principal change in supply was doubling in the number of registrations by mining engineers.
Mountain Region:							
Denver, Colorado	106	129	173	363	335	55	Sharp upturn in demand for civil engineers due to increase in construction activities. Openings received for aeronautical engineers decline.
Pacific Region:							
Seattle, Wash.	46	71	48	658	758	899	Job applications and demand for engineers declined between March and May. The former development was due to applicants returning to work or finding new jobs in other than aircraft manufacturing, while the latter was attributable to reductions in Boeing's employment needs.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	
Pacific Region: Cont.							
Portland, Oreg.	80	63	41	12	12	9	Intensified recruiting results in more registrations in May than in March; however, a large proportion of these applicants are employed while seeking an opportunity for advancement.
Los Angeles-Long Beach, Calif.	1,602	1,577	655	346	369	790	The employment slowdown which started last fall in defense-oriented industries has affected all occupations in these industries, including engineers and supporting technicians. Recent cutbacks among several large electronics firms were responsible for a sharp rise in the number of electrical engineers available. Also, applications from industrial engineers increased. However, the number of mechanical engineers registered between March and May dropped as a result of recruiting programs at an aircraft plant in a neighboring labor market area. Fewer civil engineers were registered in May than in March because of the seasonal pickup in both private and public construction programs.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, May 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	
Pacific Region: Cont.							
San Francisco-Oakland, Calif.	267	263	212	71	48	52	The labor market situation grew tighter over the past two months for engineering personnel with specialties already in short supply. Shortages were intensified in mechanical design and in electrical and chemical engineering. However, there was reduced activity in the industrial engineering classification.

CHEMISTS

The supply of chemists, as indicated by the number of applicants registered for work at public employment offices in the 30 metropolitan areas, rose by 11 percent from March to May, a somewhat larger increase than that reported for other natural scientists or engineers. Partly as a result of this increase, several areas--Buffalo, Atlanta, Kansas City, Seattle, Los Angeles-Long Beach--indicated an easier demand-supply relationship, with respect to chemists.

Some indication of the relative availability of these professional workers in various localities is afforded by the following comment from the Kansas City area: "The use of chemists in this area is largely confined to use in testing laboratories, the food industry and the metal products industries. Demand over the past several years has been low, with new hires due more to replacement than to new job posts. The supply of chemists has been greater than local demand, with the result that many local resident graduate chemists must migrate to seek advantageous employment."

To some extent, however, the numerically adequate supply situation masked rather extensive job shopping among employed applicants. In the San Francisco-Oakland area, for example, the number of chemists registered with local public employment offices rose from March to May, but this area indicated continuing needs for these workers. At one office in the area, many of the 19 applicants were seeking more satisfying employment; in another local office in the area, a high proportion of job shoppers among chemist applicants was also reported. The area outlook was also expected to improve as the local food industry had not, as yet, hired many chemists for the canning season.

OTHER NATURAL SCIENTISTS

The job market for natural scientists other than chemists eased between March and May. Not only did demand, as reflected by such indicators as unfilled openings, openings received, and clearance openings, decline during this period but, the number of job registrants at public employment offices rose some 8 percent. The entry of recent physics, mathematics and other natural science graduates into the labor market contributed to the increase in supply. As a result of these changes, the ratio of active applications to unfilled openings climbed to 2.7 to 1 in May, as compared with 2.2 to 1 in March and 1.7 to 1 for May a year earlier.

Despite the easier supply situation, applicants with special experience and advanced educational qualifications were in considerable demand. The San Francisco-Oakland area noted, for example, that those "natural scientists who can apply their training and experience to nucleonics, electronics, and chemistry are in short supply while others who are not qualified for these positions must compete with their colleagues for the few available positions."

DRAFTSMEN

The supply of draftsmen continued to increase in May. The number of these job seekers registered at public employment offices in the 30 metropolitan centers rose from 4,767 in March to over 5,700 in May, an increase of about 20 percent.

Most of the increase was centered in the Detroit area where layoffs at plants of one of the Big Three substantially increased the number of job applicants from 392 in March to 1,139 in May. In St. Louis, layoffs at an auto parts supplier plant added about 50 draftsmen to the local labor supply. Other area developments contributing to the increased supply of job applicants in this field included a lengthy labor dispute at a Boston shipyard, the reduced level of construction employment in the Dallas area, and layoffs by consulting engineering firms and establishments engaged in petroleum and oil exploration activities in New Orleans.

Despite the increased number of job registrants, labor supply-demand imbalances continue to be evident. In the Denver area, where surpluses were reported of architectural, mechanical (without industrial plant background), and map draftsmen, shortages were noted for electrical, piping, mechanical (with industrial plant experience), and aeronautical specialists. Cincinnati, with a relatively large supply of draftsmen, did not have any qualifying in the design specialty. St. Louis had a surplus of mechanical draftsmen and a number requiring satisfactory industry experience but employers were seeking those with a structural and architectural background. In the San Francisco-Oakland area, qualified draftsmen, experienced in refining operations, sewage treatment, and electronics continued to be in demand, despite an increased supply of applicants.

LABORATORY TECHNICIANS AND ASSISTANTS

Laboratory technicians were the only occupational group experiencing a somewhat more favorable job market in May than in March. Additional needs were centered in the Denver area where medical technicians are in demand; the local job applicant increase in this occupational group was reportedly attributable to entry of recent graduates into the labor market and a cooperative working agreement developed with a technician association. Other areas reporting increased needs in this occupational category included Washington, D. C., Chicago, San Francisco-Oakland, Newark, Houston, and Philadelphia. Some demand-supply problems in this field are related to present hiring qualifications. While registered technicians are being sought by hospitals and medical research centers, job applicants do not meet current specifications in many instances.

DIGEST

# of related information

Job Outlook Bright for 1960 College Graduates

Numerous employment opportunities at record pay levels are available to the 1960 college graduates, according to college placement officials and campus recruiters surveyed by "U. S. News and World Report." A similar survey of personnel officers of corporations by the "Wall-Street Journal" indicates that employment of college graduates is being increased even by some firms which are not too optimistic about business conditions for the next few months. This is being done so that firms can obtain desirable personnel for training in needed skills.

Campus visits by industry recruiters were greater than ever before, and at many colleges were up 15 to 20 percent over last year. Placement officials contend that job finding presented little difficulty to most students, and that two-thirds or more of the graduates at a number of schools had arranged for jobs before the end of the school year.

Demand is particularly strong for graduates with professional, scientific and technical training, such as engineers, physicists, chemists, and mathematicians. Salaries of $525 to $550 a month are offered these specialists by firms engaged in electronics, nuclear energy, and missile-development fields. The graduate with a master's degree received an additional $75 to $100 a month. Companies with expanding research and development staffs are on the lookout for graduates with advanced degrees. A major chemical firm has vacancies at a starting salary of nearly $10,000 a year for 125 graduates with doctor of philosophy degrees.

Personnel men found a shortage of metallurgists and chemical and electronics engineers on college campuses, while aeronautical engineers and geologists were in oversupply. However a number of the aircraft engineers were moving into missile and space work.

An appreciable increase in demand was reported for women with chemistry and math majors. Last year, research laboratories started these women in jobs at $3,600 to $3,900 annually. This year, the range is $4,000 to $4,500.

General business graduates with computer and data processing experience are offered $460 to $505 a month, about $50 above the starting salary for other general business graduates.

The general range of first year pay for eight classifications is shown in the following table. All starting salaries are above the 1959 level with increases averaging 3 to 5 percent.

Starting Salaries for the Class of 1960

Engineers and Scientists	$6,300 to $6,600
Accountants	5,400 to 5,700
Lawyers	5,100 to 5,600
General business graduates	4,900 to 5,400
Liberal arts graduates	4,800 to 5,400
Salesmen	4,400 to 5,000
Newspapermen	4,000 to 4,300
Teachers	3,800 to 4,200

U. S. News & World Report
June 6, 1960

Wall Street Journal
June 7, 1960

1960 Salary Survey in Progress

The most comprehensive information published on earnings of engineering graduates is expected to be made available at the end of the year by the Engineering Manpower Commission. This represents the fourth such survey and is expected to include more than 200,000 engineers employed in industry, government, and education. The last survey conducted showed that earnings of engineering graduates increased an average of 6.5 percent yearly from 1953 to 1958. As part of the study, engineering teachers in colleges and universities throughout the United States are furnishing data which will be analyzed in detail. The American Society for Engineering Education will assist in this phase of the project.

Engineering and Scientific
Manpower
June 1, 1960

American Salaries Attract British Engineers

One-half of the "United States engineers of age 25" received at least $6,300 during the 1955-56 fiscal year, and "for those aged 30" the U. S. average was $7,700, according to a report of the British Engineers' Guild. In contrast, the median salary in Britain for mechanical, civil and electrical engineers during the same period was $3,360. Nearly one-third received less than $2,800, and only one in four exceeded $4,800.

The disparity in salaries has caused the loss of British engineers to Canada and the United States. Furthermore, the Guild anticipates a downturn in the efficiency of British industry unless earnings are brought more in line with those in America.

Engineering Employment Practices
Newsletter
March 1960

Scientists and Engineers in Research and Development

The dollar volume of industrial research and development totaled $6.2 billion in 1956--up about 75 percent from the $3.5 billion in 1953. In 1958, this amount increased to $10 billion, and the latest estimate for 1960 is $12.4 billion. These are the findings of a comprehensive survey of funds and personnel for industrial research and development outlined in a recently published study, "Science and Engineering in American Industry," prepared by the National Science Foundation.

Other highlights of the study are:

1. About 48 percent of industry's R & D costs in 1956 were financed by government compared with 37 percent in 1953.
2. 223,000 scientists and engineers and 396,000 other workers were employed by industry in R & D activities in January 1957.
3. In January 1957, every 100 scientists and engineers involved in R & D activities were supported by an average of 70 technicians, 50 craftsmen, and 60 other workers.
4. In 1956, the average expenditure of R & D programs per scientist or engineer in manufacturing and other industries amounted to about $32,000.

Performance Determines Success on Job

Work performance, rather than personal relationship, is the most significant ingredient of success. This is the opinion of 46 selected company executives and 106 graduate students in engineering and business administration surveyed by two University of Michigan graduate students. Other important characteristics listed were: personal integrity, communication skills, logical powers, self-confidence, adaptability, and understanding of human relations.

Personal appearance was considered somewhat less important by engineers than by business administration students and provided the only appreciable difference of opinion between the two student groups.

Engineering Employment Practices
Newsletter
March 1960

Suggestions for Overcoming Engineering Shortage

Solving the shortage in quantity and quality of engineering students was the primary concern of speakers at the annual meeting of the American Society for Engineering Education, held at Purdue University in June. Practical suggestions offered by engineering educators for helping to remedy the problem of insufficient engineering manpower included:

1. Providing better guidance in high school.
2. Improving college teaching methods.
3. According technical institutes higher status.
4. Broadening graduate study activities.
5. Stressing design creativity.

Engineering News - Record
June 30, 1960

Do-It-Yourself Test Available to Engineering Job Applicants

A new do-it-yourself test that matches the technical knowledge of engineering job seekers with that of employed engineers is available to applicants desiring work with General Electric Co.'s Light Military Electronics Department. Thus, potential applicants are able to determine their chances of employment at G. E. and to gauge their own aptitudes and abilities.

The tests include radar, microwaves, communications, and electronic packaging, and have rating scales for showing how the test taker compares with working engineers who have several different levels of experience. The aptitudes of potential administrators and engineering managers are rated by a psychological inventory test.

G. E. makes available two copies of the test to any engineer with at least a bachelor's degree, and the scores are handled in a private manner. Nearly 1,000 engineers have asked for the tests since they were first announced in technical journals in May.

Business Week
June 18, 1960

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is the Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas 1/ for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

1/ The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 30.

List of 30 Major Labor Market Areas by Regions

New England:

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Newark, New Jersey
Paterson, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Indianapolis, Indiana
Chicago, Illinois
Detroit, Michigan
Milwaukee, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
Kansas City, Missouri
St. Louis, Missouri

South Atlantic:

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Dallas, Texas
Houston, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957- July 1960

Month and Year	All Occupations	Professional & Managerial	Selected Occupations 1/				
			Total	Engineers	Scientific	Draftsmen	Technicians
Jan. 1956	27,887	12,845	6,803	4,792	435	1,361	215
Jan. 1957	35,629	14,498	8,993	6,349	389	1,988	267
March	34,390	15,952	9,300	6,428	732	1,851	289
May	31,452	14,007	8,404	5,976	576	1,591	261
July	29,144	11,879	7,407	5,437	590	1,174	206
Sept.	23,208	8,986	5,480	3,946	569	791	174
Nov.	13,859	5,388	2,879	1,993	294	384	208
Jan. 1958	14,665	7,726	2,582	1,817	245	315	205
March	14,451	8,244	3,496	2,717	398	204	177
May	15,552	9,439	3,505	2,764	330	244	167
July	14,420	7,514	3,540	2,921	233	212	174
Sept.	15,363	8,732	5,303	4,447	431	255	170
Nov.	17,661	9,308	4,789	3,906	475	243	165
Jan. 1959	16,042	10,530	5,426	4,386	489	377	174
March	17,960	10,820	5,473	4,278	576	391	228
May	23,232	12,828	5,635	4,387	602	402	244
July	20,559	10,112	5,315	4,128	486	495	206
Sept.	21,414	10,140	6,320	5,096	500	548	176
Nov.	21,101	11,740	6,585	5,193	600	616	176
Jan. 1960	19,735	11,834	5,817	4,389	648	605	175
March	21,286	12,611	5,167	3,927	587	442	211
May	19,839	11,217	4,710	3,589	550	364	207
July	17,480	9,589	4,401	3,489	483	272	157

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Table II. Number of Active Applicants Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations May and March 1960, and May 1959

Labor Market Area	Chemists			Other Natural Scientists			Draftsmen			Laboratory Technicians		
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959
Total..............	783	706	750	822	761	621	5,729	4,767	4,513	2,383	2,406	2,227
Boston...............	25	25	27	32	23	26	315	279	174	127	91	125
Providence...........	2	6	10	4	2	4	38	27	44	27	29	23
Buffalo..............	28	14	27	15	18	14	55	44	110	64	65	71
New York.............	161	184	193	151	171	128	673	685	934	286	367	352
Newark...............	48	33	44	24	17	14	100	64	133	99	73	106
Paterson.............	17	11	15	8	8	3	46	77	60	42	56	47
Philadelphia.........	28	25	37	19	17	28	260	275	461	151	141	211
Pittsburgh...........	24	15	44	10	15	21	176	184	501	147	126	250
Cincinnati...........	4	3	8	6	5	7	68	36	30	28	39	42
Cleveland............	16	14	19	2	2	7	108	66	155	80	53	26
Columbus.............	3	4	1	4	4	4	34	22	12	12	19	11
Indianapolis.........	4	5	3	3	6	4	43	24	4	39	31	19
Chicago..............	33	31	43	15	16	18	110	91	174	111	95	94
Detroit..............	12	13	22	12	13	6	1,139	392	207	75	77	18
Milwaukee............	24	20	25	32	23	23	23	11	12	11	10	16
Minneapolis-St. Paul..	25	10	8	43	17	7	109	71	67	49	38	37
Kansas City..........	6	11	10	2	4	9	28	37	37	14	26	31
St. Louis............	18	13	6	16	13	9	120	68	63	56	75	26
Baltimore............	8	9	10	2	0	2	77	103	79	37	30	32
Washington...........	32	27	37	68	42	52	163	166	66	90	67	69
Atlanta..............	15	5	7	10	10	10	43	76	26	29	41	23
Louisville...........	8	8	6	2	2	1	25	24	26	16	20	20
New Orleans..........	8	10	7	25	45	35	75	53	53	31	32	25
Dallas...............	9	9	7	30	33	24	86	65	58	22	35	28
Houston..............	19	13	24	42	36	44	83	73	99	60	48	44
Denver...............	12	9	8	34	35	33	66	67	38	47	27	38
Seattle..............	10	15	3	13	13	10	46	51	50	28	26	12
Portland.............	6	8	3	5	5	2	45	53	32	32	44	26
Los Angeles-Long Beach	122	113	58	146	112	46	1,288	1,331	576	395	435	256
San Francisco-Oakland.	56	43	38	47	54	30	287	252	232	178	190	149

Table III. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations, End of Month, May and March 1960, and May 1959

Labor Market Area	Chemists			Other Natural Scientists			Draftsmen			Laboratory Technicians		
	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959	May 1960	March 1960	May 1959
Total..............	214	309	168	307	347	363	743	798	775	454	396	418
Boston................	2	4	6	5	4	19	38	28	58	60	70	51
Providence...........	1	3	1	0	0	1	5	8	3	2	1	3
Buffalo..............	8	5	5	5	15	44	16	25	19	19	21	21
New York.............	32	25	24	21	17	5	107	65	56	58	54	58
Newark...............	13	101	22	2	0	6	21	26	14	20	12	6
Paterson.............	2	2	0	2	1	3	15	12	27	8	5	5
Philadelphia.........	4	2	0	1	1	0	23	21	12	7	0	9
Pittsburgh...........	12	12	11	2	6	3	22	25	10	7	5	5
Cincinnati...........	9	7	3	3	3	4	2	4	10	10	10	1
Cleveland............	5	7	8	0	0	5	7	32	18	3	6	15
Columbus.............	1	0	0	3	3	1	3	5	14	6	4	10
Indianapolis.........	2	1	2	0	0	2	3	4	5	3	1	4
Chicago..............	20	26	15	2	2	1	49	64	33	24	13	14
Detroit..............	0	1	2	0	0	1	6	10	11	1	1	1
Milwaukee............	14	12	7	107	103	114	86	118	117	12	14	24
Minneapolis-St. Paul..	21	21	14	11	27	17	70	72	74	20	20	31
Kansas City..........	0	0	1	0	0	0	3	0	5	1	1	6
St. Louis............	16	7	4	12	11	1	20	18	22	7	7	9
Baltimore............	2	2	0	0	0	1	4	4	7	6	8	2
Washington...........	12	11	1	58	63	24	34	25	4	33	20	33
Atlanta..............	1	1	0	0	1	0	2	2	3	2	1	2
Louisville...........	1	1	0	0	0	0	7	0	2	4	1	4
New Orleans..........	0	2	0	0	0	0	0	0	2	0	0	2
Dallas...............	1	2	2	4	1	1	6	8	14	6	6	1
Houston..............	5	8	0	1	1	1	11	11	9	11	3	3
Denver...............	0	4	0	3	5	3	27	63	14	41	10	15
Seattle..............	0	0	0	34	48	62	59	5	16	0	6	1
Portland.............	0	2	0	1	0	0	6	10	14	4	5	5
Los Angeles-Long Beach	24	36	37	27	30	41	64	92	165	49	70	65
San Francisco-Oakland.	6	4	3	3	5	3	27	41	17	30	21	12

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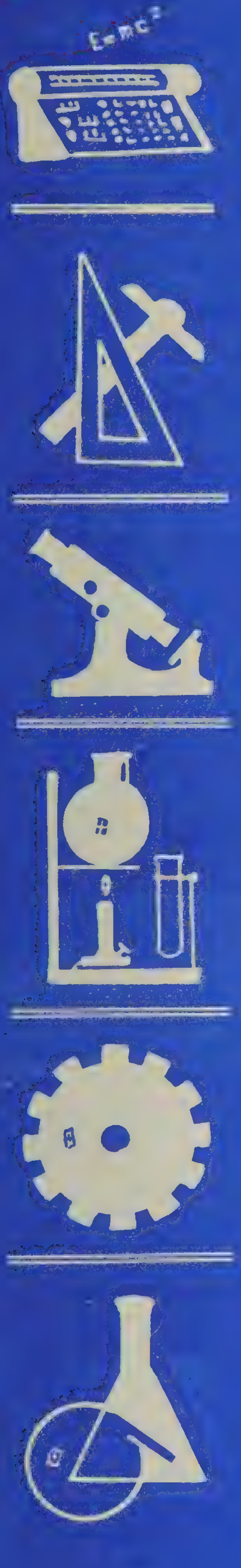

CURRENT LABOR MARKET CONDITIONS in ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

September 1960

U. S. DEPARTMENT OF LABOR
James P. Mitchell, Secretary
BUREAU OF EMPLOYMENT SECURITY
Robert C. Goodwin, Director
Washington 25, D. C.

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ENGINEERING, SCIENTIFIC, AND TECHNICAL OCCUPATIONS

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This bimonthly survey is based on field reports on current conditions in 30 major labor market areas prepared by State employment security agencies affiliated with the Bureau of Employment Security, statistics on job openings for selected engineering, scientific and technical occupations placed in interarea clearance by public employment offices throughout the country, and information obtained from various government agencies, professional societies, and other sources. This study was prepared by Benjamin Goldstein.

Office of Program Review and Analysis

Louis Levine, Deputy Director, Bureau of Employment Security

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Trend Indicators

OUTLOOK FOR ENGINEERS AND SCIENTISTS: The Nation's principal employment centers see no appreciable modification in the eased labor market conditions for engineers and scientists in the next few months. Several major labor market areas forecast a continuation of the existing demand-supply situation while others predict a slackening in the demand. From Dallas, where local employers indicate sustained production of aircraft, missiles, and electronic equipment is contingent upon procurement of additional contracts: "No significant change in the demand for workers in the selected occupations is foreseen at this time." . . . In a similar vein, from Milwaukee: "Little expansion is anticipated by durable goods producers in the area during the next four months and further cost cutting is probable. It appears, therefore, that the supply-demand situation with respect to the selected occupations will be practically unchanged." . . . In Houston: "The future outlook is not too rosy. . . . The largest consumer of technical help, the oil industry, is actually fighting for survival and has little or no demand for engineers or other technicians now or in the near future." . . . And in San Francisco-Oakland: "Work opportunities for engineering and other technical personnel are likely to decline over the next two and four month periods. The seasonal high point for many phases of the economy has already been reached. Continued retrenchment in the primary metals industry is anticipated for at least two months; sharp cutbacks are expected in construction; nonelectrical machinery is expected to be stable or declining; little push is expected from electrical machinery; and seasonal declines in certain chemical fields will partially counterbalance the zip in industrial gases and drugs. As usual, these seasonal and cyclical forces will dampen secular demand for research personnel."

THIS YEAR'S COLLEGE GRADUATES are finding employers in a number of areas more selective in personnel recruitment than last year. New York City reports that this is true not only for the liberal arts graduates who have limited occupational skills to offer, but also for those trained as teachers or engineers. . . . In Milwaukee, only recent college graduates who ranked in the upper one-third of their class are acceptable for mathematics, physics, and some of the engineering openings. . . . While in Portland, only outstanding college graduates will be interviewed.

HIRING STANDARDS ARE STIFFENED AS SUPPLY LOOSENS: New York City reports that employers are putting greater emphasis on graduate degrees, with fewer openings for B. S. graduates. . . . While in Chicago, firms adding to their staffs are setting very rigid standards. Older workers have been released as firms continue to discharge those who do not fit in with future plans. Also, in the Los Angeles-Long Beach area, there was not only a general tightening in prerequisites, but considerable replacement hiring was undertaken for the purpose of improving the staff already employed. . . . Older workers are a casualty of some of these changes. In Paterson, some older workers and jobholders without degrees were replaced by college graduates.

EMPLOYERS MORE COST CONSCIOUS IN CURRENT MARKET: In Houston, requirements for engineers and scientists declined, but demands for cost accountants rose. . . . In Milwaukee, several large firms have intensified cost reduction programs, cancelling some orders for research and development workers. . . . Detroit reports difficulty in finding new jobs for men accustomed to earning $10,000 a year or more, while universities experience little trouble in placing graduates as junior engineers at $6,000 a year. . . . In St. Louis, mechanical engineers who were laid off in the aircraft industry have taken drafting jobs at a lower pay rate. . . . The Houston Highway Department, with a large construction program, preferred to hire engineering students for temporary summer jobs instead of more trained employees, obviously figuring that the job could be done cheaper with less skilled help.

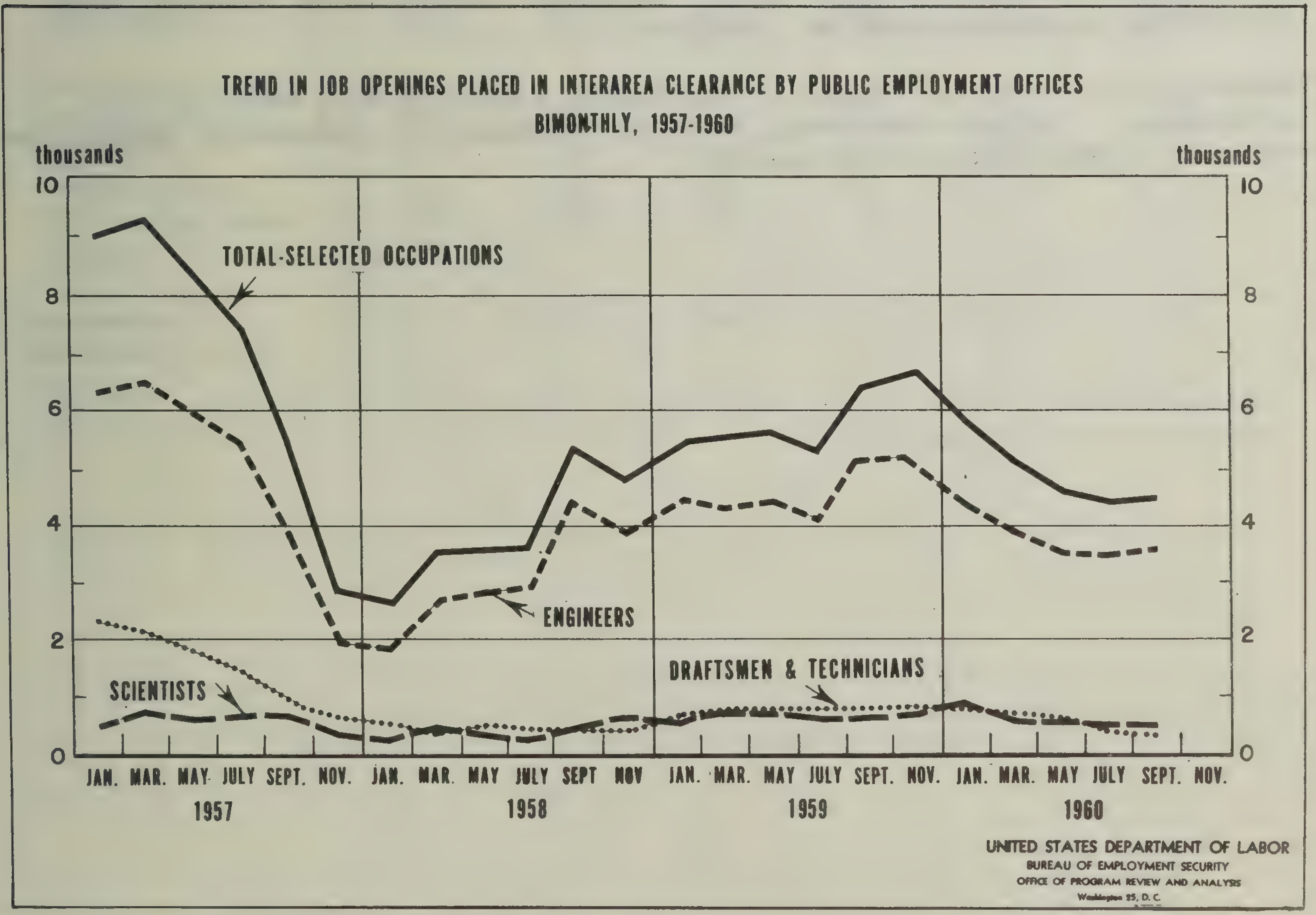
RESPONSE TO CONTINUING ENGINEERING AND SCIENTIFIC MANPOWER NEEDS: Individual: Exceptionally bright young science, physics, or math majors are leaving college in their junior or even sophomore year for a program of full-time work. These men, at the "top of their class," are being offered from $400 to $500 a month in positions where their high intellectual capacity can be used profitably. Some of these college "dropouts" plan to work for a few years to accumulate adequate funds with which to return to school and resume their collegiate education, while others hope to arrange a program of study leading to a baccalaureate degree while engaged in full-time work.
Employers: A plant in the Boston area is conducting interviews to obtain qualified personnel for a six-months' intensive training program for "engineering assistants." Requirements call for at least two years schooling in electronic theory and/or the equivalent experience as a top-grade technician or electronics engineering assistant, plus capabilities for trouble shooting.
State: In Rhode Island, the Governor recommended the appointment of a committee to study and formulate a plan to train and recruit electrical engineers for the Rhode Island electronics industry.

ELECTRONIC DATA PROCESSING MANPOWER NEEDS: Some of the largest firms in the booming electronic data processing and computing machinery industry are located in the Boston area. These firms require more mechanical, electronic, and industrial engineers for their production, training, and selling departments. Also coming up fast on the shortage list are EDP programmers and methods analysts.

AS THE FRONTIERS OF SCIENCE CONTINUE TO BE EXPANDED, the fields of scientific investigation and the required occupational talents become more esoteric. With increasing frequency, laboratories in their search for personnel no longer specify that there are openings in specific occupations but tend to state only the fields of research in which they are engaged. Illustrative of this technique, a recent advertisement sought engineers and scientists in such fields as information theory, pattern recognition, advanced systems design, artificial intelligence, celestial mechanics, and applied mechanics.

recent developments in INTERAREA RECRUITMENT

The bimonthly downtrend in clearance job openings in selected engineering, scientific, and technical occupations, which had continued uninterruptedly since November 1959, halted in September. Somewhat increased needs for engineers reported between July and September more than counterbalanced reduced openings for draftsmen. For the selected group of occupations, clearance openings numbered 4,450 in September, a rise of about 1 percent from the two-months' earlier level. Total hard-to-fill job needs, however, were about 30 percent below the 6,300 reported in September 1959.



TREND IN JOB OPENINGS PLACED IN INTERAREA CLEARANCE BY PUBLIC EMPLOYMENT OFFICES
BIMONTHLY, 1957-1960

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF EMPLOYMENT SECURITY
OFFICE OF PROGRAM REVIEW AND ANALYSIS
Washington 25, D. C.

Engineering vacancies, accounting for four-fifths of total clearance openings in selected occupations, rose by 100 from July to September. The advance was confined to the mechanical, aeronautical, and civil engineering groups. Gains were occasioned especially by increased Federal government needs in Ohio and expanded aircraft industry requirements for mechanical engineers in South Dakota and Washington, and for aeronautical engineers in California.

In the important electrical group, which has long dominated shortages in the engineering field, a net loss of almost 100 openings was reported. A major communication equipment manufacturer in North Carolina withdrew a sizable order for these workers while Seattle's aircraft industry curtailed its requirements. These reductions more than counterbalanced added demands for workers in this classification by the aircraft industry in Colorado and South Dakota, and the Federal government for work in Ohio and Colorado. Cutbacks in requirements for industrial engineers in Seattle's aircraft industry also contributed to reduced openings in this category.

Job opportunities for natural scientists experienced a limited pickup, aided by increased openings for physicists. Somewhat reduced needs, however, were reported for mathematicians and chemists.

Vacancies for draftsmen dropped by one-fourth from July to a total of 200 in September. On the other hand, clearance listings for laboratory technicians advanced slightly during this period.

Number of Nonagricultural Job Openings in Selected Occupations in Interarea Clearance at Public Employment Offices, U. S. Total, September and July 1960, and September 1959

Selected Occupations	Job Openings			Change to September 1960 from:			
				July 1960		September 1959	
	Sept. 1960	July 1960	Sept. 1959	Number	Percent	Number	Percent
All Selected Occupations	4,453	4,401	6,320	+52	+1.2	-1,867	-29.5
Engineers, total	3,591	3,489	5,096	+102	+2.9	-1,505	-29.5
Chemical	139	167	100	-28	-16.8	+39	+39.0
Civil	338	276	223	+62	+22.5	+115	+51.6
Electrical	1,761	1,850	2,558	-89	-4.8	-797	-31.2
Industrial	187	227	335	-40	-17.6	-148	-44.2
Mechanical	792	675	979	+117	+17.3	-187	-19.1
Aeronautical	342	259	822	+83	+32.0	-480	-58.4
Natural Science Occupations	492	483	500	+9	+1.9	-8	-1.6
Chemists	137	140	140	-3	-2.1	-3	-2.1
Physicists	184	162	162	+22	+13.6	+22	+13.6
Mathematicians	122	129	145	-7	-5.4	-23	-15.9
Other	49	52	53	-3	-5.8	-4	-7.5
Draftsmen	201	272	548	-71	-26.1	-347	-63.3
Laboratory technicians	169	157	176	+12	+7.6	-7	-4.0

CURRENT TRENDS IN

LABOR DEMAND -- SUPPLY SITUATION

SUMMARY - 30 MAJOR AREAS

The labor market situation for engineers, scientists and technical personnel during the May to July 1960 period was characterized by some further overall contraction in employment opportunities and a continued increase in the supply of job applicants. Unfilled job openings for draftsmen, laboratory technicians, chemists and other natural scientists declined about 15 percent in the 30 major reporting areas. Manpower needs in the engineering group remained relatively stable in this period, however. Durable goods cutbacks and the entry of college graduates into the labor market helped push job registrants in the selected occupations in the 30 areas to a total of 18,100 in July, an increase of almost 2,500 or 16 percent from the May level.

Engineers and draftsmen accounted for about 70 percent of the increased job applicant total during the bimonthly period. Among the hard goods industries contributing to the eased manpower situation, aircraft, auto and steel curtailments were especially significant. Appreciable needs continued to be reported for engineers, however, despite the growing number of job registrants, with this category accounting for some two-thirds of the unfilled openings in the selected occupations. More than half of total needs in the engineering category were reported for electrical engineers.

Applicant files in the drafting field showed the largest numerical increase among the selected occupations between May and July. Employers were becoming more selective in their educational and other hiring specifications with the increased supply of registrants.

Job applications by chemists and other natural scientists, such as physicists and mathematicians, also increased, as did those by laboratory technicians and assistants. In the latter category, the shortage of registered, medical technicians persisted.

ENGINEERS

The supply of engineers, as indicated by the number of active job registrations in the 30 reporting major labor market areas, continued to expand between May and July 1960. The number of applicants seeking engineering work through public employment offices in these localities increased more than 800 (+14 percent) to a total of about 6,800. The increase was widespread, extending to more than three-fourths of the reporting areas and to all classifications of engineers.

Cutbacks in aircraft, layoffs in autos because of model changeover and weaknesses in steel and other durable goods were reported in major industrial centers in the May-July period. These curtailments, supplementing the midyear entry of college engineering graduates into the labor market, enlarged the supply of job applicants, particularly in the mechanical, industrial and electrical engineering groups.

Number of Engineering Job Applicants
July and May 1960 and July 1959

Engineering Specialty	Active Applications			Increase to July 1960 from:			
				May 1960		July 1959	
	July 1960	May 1960	July 1959	Number	Percent	Number	Percent
Engineers, total	6,783	5,958	4,592	825	13.8	2,191	47.7
Metallurgical	102	86	74	16	18.6	28	37.8
Chemical	353	292	332	61	20.9	21	6.3
Civil	923	918	915	5	0.5	8	0.9
Electrical	1,093	948	679	145	15.3	414	61.0
Industrial	1,334	1,081	826	253	23.4	508	61.5
Mechanical	2,557	2,296	1,635	261	11.4	922	56.4
Aeronautical	335	274	73	61	22.3	262	358.9
Mining	86	63	58	23	36.5	28	48.3

Four labor market areas--Newark, Los Angeles-Long Beach, Chicago, and Denver--each with at least 100 more registrations in July than in May, accounted for a major share of the increased number of engineering job applicants at public employment offices. The Newark labor market area, recently redefined, was estimated to have twice as many job seekers in July than two months' earlier; most of the additional applicants were industrial engineers. The Los Angeles-Long Beach area reported that layoffs among aircraft and other firms contributed to the increase in registrants. In Chicago and Denver, recent college graduates accounted for a large part of the increased availability of engineers.

Despite the increased supply of engineers, significant manpower requirements continued to be reported, particularly in research, design and development work and other fields characterized by fast-moving technological changes. Many of the currently hard-to-fill jobs require creative talent, advanced academic degrees, and extensive work experience in highly specialized phases of engineering. In the 30 areas, the demand for engineers, as indicated by unfilled openings, persisted at the May level of almost 3,100 openings. Some shifts in demand, however, occurred among the various engineering categories, with increases in unfilled openings for electrical and chemical engineers counterbalancing declines for mechanical and industrial engineers.

The increased needs for electrical engineers raised the proportion of all engineering unfilled openings found in this group to 52 percent in July, as compared with 50 percent in May and 42 percent in July a year earlier. The added job listings in July were due largely to needs at Boeing (Seattle) for its aerospace program. The public utility industry serving the Portland, Oregon area also reported demands for some engineers experienced in the electrical field.

Chemical engineers were the only group showing an over-the-year as well as bimonthly increase in unfilled openings. Recent increases in job opportunities were centered in the Washington (D. C.), Los Angeles-Long Beach, Buffalo and Chicago areas.

Area Trends

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications July 1960	Active Applications May 1960	Active Applications July 1959	Unfilled Openings at end of: July 1960	Unfilled Openings at end of: May 1960	Unfilled Openings at end of: July 1959	Comments
Summary, 30 Areas	6,783	5,958	4,592	3,064	3,074	4,249	The job market for engineers continued to ease at the start of the second half of 1960. Most of the 30 reporting areas had more engineering job seekers in July than in May. Labor supply increases were occasioned by auto, aircraft, steel, and other durable goods cutbacks as well as the entry of recent college graduates into the labor market. Unfilled job openings continued at above the May level, with additional requirements for electrical and clerical engineers generally offsetting declines for industrial and mechanical engineers.
New England Region:							
Boston, Mass.	221	252	208	78	75	131	Job applications from all types of engineers were down from May, largely because of the settlement of the shipbuilding labor-management dispute which lasted nearly six months and involved thousands of workers, including engineers and related personnel.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	
New England Region: Cont.							
Providence, R. I.	61	58	52	14	3	6	Overall supply largely unchanged, with largest concentrations of job applicants in the industrial and mechanical engineering classifications. Many of these job seekers are on temporary layoff status from machine tool and other plants. Many of the remaining applicants are employed but are seeking better job opportunities. Demand up sharply over the two months' period although still relatively limited.
Middle Atlantic Region:							
Buffalo, N. Y.	146	129	137	45	48	29	Engineering applications rise, particularly among mechanical engineers. Unfilled openings relatively stable.
New York, N. Y.	488	619	676	112	132	68	Job registrations from civil and mechanical engineers drop although largest concentrations of engineering applicants still reported in these groups.
Newark, N. J. 1/	296	141	141	76	97	103	Number of job applicants in area estimated to have doubled from May to July. Most of increase centered in industrial group. Demand for engineers reduced appreciably in same period.

1/ Newark area redefined. Active applications for May 1960 and July 1959 are estimated.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	
Middle Atlantic Region: Cont.							
Paterson, N. J.	117	74	109	26	25	19	Labor market influx of industrial and mechanical engineers doubles number of job applicants in these classifications. Only civil and electrical engineering registrants decline somewhat between May and July.
Philadelphia, Pa.	308	311	452	18	25	133	Aggregate supply relatively unchanged. Applications from mechanical engineers rise slightly while those from electrical engineers drop. Other changes not numerically significant. Most significant demand continues to be reported for electrical engineers.
Pittsburgh, Pa.	180	164	245	46	39	53	Increased job registrants recorded in all engineering groups, except metallurgical and electrical. Continuing demand for engineers with specific experience.
East N. Central Region:							
Cincinnati, Ohio	80	55	32	16	23	225	Job market continues to ease with applications up appreciably. Unfilled openings less than one-tenth year-ago level.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	
East N. Central Region: Cont.							
Cleveland, Ohio	160	129	139	32	42	55	Reduced business activity contributes to upturn in registrations. Principal applicant rise reported among mechanical engineers, followed by industrial and electrical engineers. Unfilled openings for mechanical engineers down significantly as orders are cancelled.
Columbus, Ohio	31	47	17	39	18	93	Unfilled openings up sharply in July over May, mainly as result of orders for mechanical engineers. Engineering applications down one-third in same period. Many available applicants do not meet current employer hiring specifications.
Indianapolis, Ind.	52	41	18	20	25	31	Auto layoffs contribute to increased job registrations. Unfilled openings for engineers decline, chiefly in mechanical group.
Chicago, Ill.	321	191	268	88	99	153	Large part of applicant rise due to entry of recent graduates into labor market. Unfilled openings decline during bimonthly period.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	
East N. Central Region: Cont.							
Detroit, Mich.	541	458	280	6	7	9	Auto industry's model changeover contibutes to increased supply of available engineers; recalls expected when changeover is completed.
Milwaukee, Wis.	140	94	113	296	349	331	Durable goods employment declines combined with labor market entry of recent graduates major factors in increased supply of workers. Out-of-area relocation of machinery manufacturer another contributing factor as many professional employees decline opportunity to transfer. Job openings drop as needs in research and development activities are curtailed by large machinery firms.
West N. Central Region:							
Minneapolis-St. Paul, Minn.	161	201	70	129	147	149	Engineering applications decline as recent graduates obtain jobs. Greatest need reported for electrical engineers.
Kansas City, Mo.	31	42	26	2	0	6	Job applications decline as number of engineers secure jobs outside area.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications July 1960	Active Applications May 1960	Active Applications July 1959	Unfilled Openings at end of: July 1960	Unfilled Openings at end of: May 1960	Unfilled Openings at end of: July 1959	Comments
West N. Central Region: Cont.							
St. Louis, Mo.	200	149	92	80	137	81	Supply of mechanical and aeronautical engineers continues to increase because of layoffs by aircraft firm. Electrical engineers needed for work in missile field.
South Atlantic Region:							
Baltimore, Md.	62	59	10	116	109	97	Overall supply of registrants relatively stable. Rising number of applications from mechanical engineers counterbalances drop for electrical engineers.
Washington, D. C.	268	220	124	254	166	90	Increase in applications due to layoffs by local engineering research and development firms affected by curtailment and cancellation of aircraft contacts. Rise in unfilled openings attributable to ILO-United Nations requests for technical personnel for overseas work.
Atlanta, Ga.	76	93	60	1	7	5	Fewer applications from mechanical engineers primarily responsible for drop in overall supply. Most categories have more than adequate supply.
East S. Central Region:							
Louisville, Ky.	17	13	16	3	3	6	Demand remains limited; job applications up somewhat.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	
West S. Central Region:							
New Orleans, La.	52	47	70	3	3	6	Some increase reported in registered job seekers; listed labor needs continue to be slight.
Dallas, Texas	177	154	110	15	20	73	Supply of engineers continues to increase. Aircraft employment hit by cancellation of missile contract at Temco Aircraft Corporation. Seasonal construction upswing fails to develop to extent anticipated.
Houston, Texas	166	109	98	9	20	15	Sharp upturn in number of applications due largely to curtailed activities in oil industry.
Mountain Region:							
Denver, Colorado	213	113	125	273	368	330	Inmigration and entry of graduates into labor market help enlarge engineering supply. Job openings for aeronautical and mechanical engineers reduced sharply.
Pacific Region:							
Seattle, Wash.	73	46	58	841	658	904	Rise in unfilled openings reflects, in large measure, added requirements for electrical and aeronuatical engineers in Boeing's aerospace program. Some rise in applications, especially among civil and mechanical engineers.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	
Pacific Region: Cont.							
Portland, Oreg.	83	80	50	20	12	26	Overall supply relatively unchanged. While registrations of civil engineers drop sharply, applications of electrical, industrial, and mechanical engineers increase. Pickup in unfilled openings due largely to a public utility job order for electrical engineers.
Los Angeles-Long Beach, Calif.	1,737	1,602	577	346	346	983	Sustained retrenchment in aircraft manufacturing, layoffs among other durable goods firms, and entry of college graduates into labor market contribute to mounting surplus of engineers. Demand for engineers, as reflected by unfilled openings, remains unchanged. Principal needs reported for electrical engineers. Advanced degrees and training in specialized fields required in many cases; more than half of engineering job seekers, however, are without any degree.

Trends for Engineers--Selected Area Indicators
30 Major Labor Market Areas, July 1960

Region and Area	Active Applications			Unfilled Openings at end of:			Comments
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	
Pacific Region: Cont.							
San Francisco-Oakland, Calif.	325	267	219	60	71	39	New graduates further ease demand-supply situation at start of second half of 1960. Some decline in unfilled openings reported, particularly for mechanical and electrical engineers; continuing manpower needs in these specialties reported, however.

CHEMISTS

The manpower supply-demand situation for chemists eased further between May and July as recent college graduates entered the labor market and competed for available jobs. The number of chemists registered for work at local public employment offices rose 17 percent to a total of 909 during the bi-monthly period, a larger percentage increase than that recorded among engineers or draftsmen but less than that for other natural scientists or laboratory technicians. Unfilled openings in this field decreased somewhat in the May-July period.

The general adequacy of supply among chemists is reflected in reports from a number of major industrial centers. The New York City area, for example, indicates insufficient job openings for recent college graduates who have majored in chemistry. In Kansas City, supply is well in excess of demand and, as a result, resident graduate chemists frequently find it necessary to migrate to seek advantageous employment. To some extent, however, increases in job registrations reflect job shopping among applicants rather than unemployment. In the San Francisco-Oakland area, for example, supply is described as tight despite an appreciable increase in job registrants over the year. The area reports that a sizable number of applicants are not jobless but merely seeking more rewarding employment. Firms which can offer employment of a seasonal nature only are reportedly having difficulty securing qualified personnel. The area outlook was also expected to improve with firms announcing plans to expand present facilities or establish new plants. Demands in certain specialties and current educational and other hiring specifications also contribute to labor demand-supply imbalances. The Minneapolis-St. Paul area, for example, reports a rise in the backlog of unfilled openings because of the demand for food chemists. A number of openings for chemists with graduate degrees remain unfilled in the St. Louis area despite the numerical adequacy of the local labor supply in this field.

OTHER NATURAL SCIENTISTS

With the influx of school graduates into the labor market, the supply of natural scientists other than chemists has also increased. In the 30 reporting areas, the number of active applications in this group rose to almost 1,000 in July, an increase of over 150 or about 19 percent from May. Labor needs, as expressed in new job orders received, clearance openings, and openings unfilled at the end of the month, did not experience any marked change.

Despite the increased availability of qualified personnel, long-standing demands for natural scientists continue to attract interest in job opportunities in this field. The Boston report, for example, notes a significant development in this regard. A number of top college graduates are reportedly entering natural scientist specialties rather than the medical field because a master's degree and Ph.D. can be earned in considerably less time. In addition, during work for advanced degrees in physics, mathematics and related specialties, there are opportunities for employment at relatively high wage levels, in some instances by employers paying tuition expenses. For a number of intellectually superior young men without substantial financial resources, these potentialities appear to be more attractive than those found in the medical profession.

DRAFTSMEN

Job opportunities for draftsmen declined between May and July as the available labor supply mounted. In July, there were over 900 additional job applicants (+16 percent) registered at public employment offices in the 30 reporting major areas than two months earlier. The 6,600 current job registrations were almost 2,200 higher than reported a year ago.

The rise in the number of job applications from May to July of this year was occasioned by layoffs among aircraft firms in Los Angeles-Long Beach and other areas, auto layoffs related to model changeovers, as well as the entry of recent graduates into the labor market. The current ratio of active applications to unfilled openings reflects the easier supply situation for draftsmen. In July, 11.4 applicants were available for each unfilled job opening as compared with 7.7 in May and 5.9 in July 1959.

Employer hiring specifications continue to highten, according to area reports. A college education was being required increasingly in job orders listed in Columbus, Ohio. In the San Francisco-Oakland area, employers reportedly had a "strong predilection" for the draftsman with a college degree. In these and other areas, however, fewer than 1 applicant in 10 had graduated from college.

LABORATORY TECHNICIANS AND ASSISTANTS

Some 2,800 job seekers filed work applications in this category with public employment offices in the 30 metropolitan centers in July, an increase of more than 400, or 18 percent, from the May level. Job openings for laboratory technicians were reduced somewhat in the same period, aided by the increased availability of college graduates and other job seekers.

Despite the increased number of job seekers, registered medical technicians remained in short supply. The San Francisco-Oakland area reported that "medical technologists with degrees, especially those eligible for California licensing, are in short supply and that the shortage appears to be growing month by month." In the Minneapolis-St. Paul labor market area, job orders for medical technicians were placed in interarea clearance as hospitals sought additional staff for expanded facilities. To some extent, current hospital salary scales reportedly limit manpower recruitment in this field.

DIGEST

# of related information

Shifts in Defense Spending

A 2 billion dollar increase in new orders for arms over the level of contracts awarded last year is foreseen by defense officials on the basis of latest military production plans. In the current fiscal year, ending in mid-1961:

1. Actual spending for defense, including atomic energy, aid to allies, space and other programs, will rise to $46.6 billion, up $600 million from the year that ended in mid-1960.

2. New orders for submarines, missiles, and other military equipment: Up about $1.2 billion to around $15.1 billion, by present estimates.

3. Research and development: New contracts up about $800 million, to an estimated total of $4.6 billion.

The outlook for some major types of defense contracts follows this pattern:
Missiles: Contracts will rise faster than any other in the year ahead. Although final figures are not yet in, it is estimated that new orders for missiles and their associated ground-support equipment will climb above $4.5 billions in the current year.

About half the money will go for the four main strategic missiles--Atlas, Titan, Minuteman, and Polaris. Including research, and the cost of submarines for the Polaris, the total money programmed for these four weapon systems will be 50 percent higher than in 1959.

Aircraft: Contracts will rise by around 600 million, to a total of 6.5 billion.

The Air Force is to order around 700 planes, including B-52 intercontinental jet bombers; B-58 supersonic, medium-range jet bombers; KC-135 jet tankers; F-105 tactical fighters; C-130 airlift transport. Development work on the B-70 supersonic, long-range bomber is to be doubled, to 195 million a year.

Research and development: Contracts, including testing activities, will mount sharply to about 4.6 billion, up nearly one fifth from last year. Aircraft research will include work on an atomic plane, on the X-15 hypersonic, high altitude research craft and the manned rocket vehicle Dyna-Soar.

Electronics and communication equipment: Contracts, for devices other than those in complete aircraft, missiles and ships, will total about 1.1 billion. This is to include radar for military aircraft-control and warning systems.

Adjustments to defense spending hit hardest in aircraft-production centers, such as southern California. In recent years, California has had about one-fifth of the nation's defense dollars, with much of the money concentrated in orders for aircraft.

In the shift to missiles, aircraft jobs in California have dropped 40,000 or 16 percent, from year-ago levels.

Missiles projects take more engineers, and fewer assembly-line workers, than does aircraft production. So the increase in missile spending offers scant hope of expanding job opportunities for big numbers of workers, although it may produce more calls for engineers, already in short supply.

Increases in the size of aircraft contracts, on the scale now planned, may not boost employment much, either. Today's planes are more complex and expensive, per model, and wages are higher. An increase in the dollars spent for planes does not produce the same amount of new employment it would have generated 10 years ago.

U. S. News and World Report
September 5, 1960

Attracting and Holding Scientific Personnel

The Ford Motor Company took steps recently to strengthen its Scientific Laboratory, which is devoted to basic research. The company has "guaranteed" the lab's budget for the next five years.

Between now and mid-1961, lab personnel will increase by more than 50 percent. There are now about 175 scientists and technicians at work in the lab. About 50 of them have Ph.D.'s, another 80 have M.S. and B.S. degrees. By next summer the company would like to have nearly 100 Ph.D.'s working in the Laboratory. Ford's scientists can poke around in any research area they desire, says Dr. Goldman, manager of the physics department. There are also product rewards--publication of findings. In addition, there is a free exchange of ideas between laboratory scientists and those of other companies and in other nations.

This approach has brought recognition and prestige to the Laboratory. It has also brought stability. There has been no departure of top people. Dr. Goldman also says that "since the announcement of the 5-year plan, it is becoming almost ridiculously easy to attract scientific leaders. Technical stability is more important with scientists than personal security. They want to be able to see a project through--not worry if it'll be stopped midway."

The Iron Age
July 28, 1960

Military Electronics Boom Slows-- Industry Seeks Civilian Markets

Military electronics manufacturers can no longer expect the phenomenal yearly market expansions of 15 to 25 percent prevailing since 1955. They must adjust to growth levels prevailing in other segments of the electronics industry.

This warning was sounded in a report prepared for the Electronics Industries Association Board of Directors and was based on a survey of opinion of more than 50 marketing experts in the association's membership.

This changing situation presents the industry with a challenge to apply its military equipment experience to the development of new products for civilian markets. It can also strengthen the country's defense capabilities by shifting to relatively undeveloped military areas, such as ballistic missile defense, surveillance systems, and new communications systems for combat defense.

The report stated that the military electronics industry may now have a capacity as much as 25 percent above present needs. This situation, however, can be expected to come into balance as growing needs restore the supply-demand balance.

The slackening military market is compelling the electronics industry to diversify. At the Western Electric Show and Convention in Los Angeles, management was told that in the future additional commercial and industrial uses for electronics products must be found.

At present, the electronics market is approximately 60 percent military and 40 percent industrial-commercial. The long dependence on the military must change and industry leaders expect that it may take as long as five years to reach the 50-50 market.

Agriculture and the development of automatic positioning for precision machine tools are among the non-military markets ripe for electronic products.

Electronic Industries Association
Weekly Report, Sept. 19, 1960
The Iron Age, Sept. 1, 1960

U. S. Civil Service Commission Announces New Hiring Rates for Engineers and Scarce-Category Scientists

With the recent Federal employees' salary increase, effective with the first pay period which began on or after July 1, 1960, the Civil Service Commission has taken action to raise hiring rates for engineers and scarce-category scientists to the new top step-rate for grades 5 and 7. As a result, minimum hiring rates for engineers and scarce-category scientists with a bachelor's degree are now $5,335 ($444.58 per month) and $6,345 (528.75 per month). These are the rates for the initial assignments of such eligibles. The $6,345 rate applies to those graduates with a bachelor's degree who are B or better students or who are in the upper 25 percent of their class.

Recruiting Costs Up; Results Down

Industrial firms are spending more money in drives to recruit engineers but are finding it more difficult to get the needed number and quality of men.

A survey of 35 corporations by Industrial Relations News indicates that the continual bombardment of bigger and better job offers has strained the credulity of engineers. They have begun to feel that one company is just the same as another. This attitude is making recruiters' jobs more difficult and is sending cost-per-hire figures skyrocketing. Cost-per-hire figures run from $500 up to $8,000 with the largest group falling in the $1,500 to $2,500 bracket.

Engineering Employment Practices
Newsletter, September 1960

appendix

Technical Notes

Information in this report is based chiefly on two kinds of data, both prepared in the Office of Program Review and Analysis of the Bureau of Employment Security. Since January 1957, the Bureau has been publishing reports on the number of job openings in a group of selected occupations placed in interarea clearance by public employment offices. The source of information on clearance openings is the Inventory of Job Openings, published every two weeks by each State employment security agency. These inventories list all openings currently in clearance (a process of matching workers in one area with jobs in other areas) by State agencies affiliated with the United States Employment Service.

Supplementary data on the same occupations were requested from the field offices of the 30 largest labor market areas [1] for the first time in May 1958. These area labor market reports provide bimonthly information on the local demand-supply relationships for engineering, scientific and technical personnel in the area.

The demand-supply relationship in the selected categories is not always indicated by the numerical data. Active applications or registrations show the number of individuals in the selected occupations who apply for work at public employment offices. In a like manner, openings received and unfilled at the end of the month are not complete measures of demand since they cover only job orders placed with public employment offices. Despite these limitations, the data provide an indication of the demand-supply trend and its nature.

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[1] The occupations covered and the appropriate code number from the Dictionary of Occupational Titles include: Engineers, metallurgical and metallurgists (0-14), engineers, chemical (0-15), engineers, civil (0-16), engineers, electrical (0-17), engineers, industrial (0-18), engineers, mechanical (0-19), engineers, aeronautical (0-19.03), engineers, mining (0-20), chemists (0-07), natural scientists, n.e.c. (0-35), draftsmen (0-48), and laboratory technicians and assistants (0-50). A list of the 30 areas appears on page 25.

List of 30 Major Labor Market Areas by Regions

New England:

Boston, Massachusetts
Providence, Rhode Island

Middle Atlantic:

Buffalo, New York
New York, New York
Newark, New Jersey
Paterson, New Jersey
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania

East North Central:

Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Indianapolis, Indiana
Chicago, Illinois
Detroit, Michigan
Milwaukee, Wisconsin

West North Central:

Minneapolis-St. Paul, Minnesota
Kansas City, Missouri
St. Louis, Missouri

South Atlantic:

Baltimore, Maryland
Washington, D. C.
Atlanta, Georgia

East South Central:

Louisville, Kentucky

West South Central:

New Orleans, Louisiana
Dallas, Texas
Houston, Texas

Mountain:

Denver, Colorado

Pacific:

Seattle, Washington
Portland, Oregon
Los Angeles-Long Beach, California
San Francisco-Oakland, California

tables

Table I. Trend in Job Openings Placed in Interarea Clearance by Public Employment Offices, January 1956, and Bimonthly, January 1957-September 1960

Month and Year	All Occupations	Professional & Managerial	Selected Occupations 1/				
			Total	Engineers	Scientific	Draftsmen	Technicians
Jan. 1956	27,887	12,845	6,803	4,792	435	1,361	215
Jan. 1957	35,629	14,498	8,993	6,349	389	1,988	267
March	34,390	15,952	9,300	6,428	732	1,851	289
May	31,452	14,007	8,404	5,976	576	1,591	261
July	29,144	11,879	7,407	5,437	590	1,174	206
Sept.	23,208	8,986	5,480	3,946	569	791	174
Nov.	13,859	5,388	2,879	1,993	294	384	208
Jan. 1958	14,665	7,726	2,582	1,817	245	315	205
March	14,451	8,244	3,496	2,717	398	204	177
May	15,552	9,439	3,505	2,764	330	244	167
July	14,420	7,514	3,540	2,921	233	212	174
Sept.	15,363	8,732	5,303	4,447	431	255	170
Nov.	17,661	9,308	4,789	3,906	475	243	165
Jan. 1959	16,042	10,530	5,426	4,386	489	377	174
March	17,960	10,820	5,473	4,278	576	391	228
May	23,232	12,828	5,635	4,387	602	402	244
July	20,559	10,112	5,315	4,128	486	495	206
Sept.	21,414	10,140	6,320	5,096	500	548	176
Nov.	21,101	11,740	6,585	5,193	600	616	176
Jan. 1960	19,735	11,834	5,817	4,389	648	605	175
March	21,286	12,611	5,167	3,927	587	442	211
May	19,839	11,217	4,710	3,589	550	364	207
July	17,480	9,589	4,401	3,489	483	272	157
September	15,380	8,137	4,453	3,591	492	201	169

Source: Department of Labor, Bureau of Employment Security, Office of Program Review and Analysis

1/ Data will differ from that previously published because of the exclusion of technical writers from the selected occupations.

Table II. Number of Active Applications Registered by Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations July and May 1960, and July 1959

Labor Market area	Chemists			Other Natural Scientists			Draftsmen			Laboratory Technicians		
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959
Total.	909	775	842	977	820	707	6,641	5,706	4,462	2,788	2,354	2,256
Boston	32	25	42	47	32	37	241	315	199	100	127	95
Providence	10	2	8	5	4	2	46	38	27	38	27	16
Buffalo.	26	28	16	17	15	16	82	55	90	87	64	53
New York	193	161	246	153	151	113	523	673	728	307	286	254
Newark	63	40	40	22	20	28	174	84	113	150	84	90
Paterson	18	17	13	10	8	3	63	37	54	53	37	31
Philadelphia	38	28	35	27	19	36	290	260	505	180	151	229
Pittsburgh	16	24	36	17	10	26	174	176	491	155	147	259
Cincinnati	10	4	7	5	6	3	104	68	30	54	28	36
Cleveland.	16	16	21	11	2	10	191	108	168	116	80	44
Columbus	2	3	1	0	4	0	25	34	21	11	12	11
Indianapolis	4	4	3	7	3	2	69	43	18	57	39	16
Chicago.	56	33	50	15	15	18	172	110	240	126	111	98
Detroit.	25	12	27	12	12	0	1,267	1,139	273	66	75	117
Milwaukee.	24	24	21	40	32	23	65	23	11	13	11	15
Minneapolis-St. Paul .	14	25	15	34	43	19	116	109	75	50	49	38
Kansas City.	10	6	10	3	2	10	33	28	31	17	14	18
St. Louis.	17	18	14	23	16	16	165	120	77	67	56	37
Baltimore.	15	8	5	13	2	1	106	77	39	51	37	16
Washington	51	30	43	64	67	63	136	162	69	66	79	53
Atlanta.	13	15	18	15	10	15	54	43	40	47	29	27
Louisville	4	8	4	0	2	3	19	25	33	16	16	16
New Orleans.	11	8	7	32	25	35	52	75	50	31	31	25
Dallas	10	9	9	33	30	25	91	86	67	27	22	31
Houston.	22	19	30	60	42	30	94	83	104	85	60	49
Denver	12	14	27	41	37	54	82	69	55	73	49	67
Seattle.	9	10	13	11	13	13	48	46	45	25	28	25
Portland	9	6	3	5	5	3	54	45	36	35	32	29
Los Angeles-Long Beach	115	122	58	194	146	64	1,781	1,288	543	473	395	270
San Francisco-Oakland.	64	56	20	61	47	39	324	287	230	212	178	191

Table III. Number of Unfilled Openings at Public Employment Offices in 30 Major Labor Market Areas, for Selected Occupations End of Month, July and May 1960, and July 1959

Labor Market area	Chemists			Other Natural Scientists			Draftsmen			Laboratory Technicians		
	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959	July 1960	May 1960	July 1959
Total.	192	213	160	286	314	308	583	741	756	400	453	373
Boston	2	2	4	9	5	8	43	38	42	85	60	52
Providence	2	1	0	0	0	0	10	5	4	4	2	1
Buffalo.	0	8	7	7	5	6	10	16	17	26	19	27
New York	32	32	16	8	21	3	88	107	76	27	58	37
Newark	9	11	17	4	5	2	17	19	34	4	18	11
Paterson	3	2	0	3	2	2	9	15	6	12	8	0
Philadelphia	1	4	0	0	1	0	12	23	1	6	7	1
Pittsburgh	8	12	11	4	2	2	26	22	23	4	7	21
Cincinnati	7	9	4	1	3	4	3	2	10	8	10	4
Cleveland.	5	5	8	0	0	6	3	7	21	2	3	8
Columbus	2	1	0	4	3	7	10	3	11	6	6	0
Indianapolis	2	2	1	0	0	2	5	3	5	1	3	2
Chicago.	14	20	23	3	2	4	42	49	53	18	24	27
Detroit.	0	0	1	0	0	0	3	6	4	1	1	1
Milwaukee.	8	14	8	106	107	104	54	86	121	15	12	21
Minneapolis-St. Paul .	24	21	16	7	11	10	31	70	27	17	20	24
Kansas City.	1	0	0	0	0	0	2	3	6	2	1	7
St. Louis.	10	16	1	4	12	0	5	20	12	10	7	11
Baltimore.	2	2	0	0	0	2	2	4	5	2	6	1
Washington	16	12	5	34	58	23	30	34	5	39	33	28
Atlanta.	2	1	0	2	0	0	2	2	5	1	2	1
Louisville	1	1	2	0	0	0	3	7	4	0	4	1
New Orleans.	1	0	0	0	0	0	1	0	2	0	0	1
Dallas	3	1	2	1	4	1	8	6	12	4	6	1
Houston.	3	5	1	0	1	2	6	11	13	4	11	1
Denver	3	1	1	16	7	9	26	27	38	58	42	31
Seattle.	0	0	0	46	34	62	53	59	5	0	0	5
Portland	0	0	0	0	1	0	7	6	9	3	4	5
Los Angeles-Long Beach	24	24	26	27	27	48	55	64	168	17	49	19
San Francisco-Oakland.	7	6	6	0	3	1	17	27	17	24	30	24

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